The Chemical Age

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Notes and Comments

The Newcastle Meeting

NEWCASTLE-UPON-TYNE was the first town in Great Britain to conceive the idea of a chemical industry organisation, for the Newcastle Chemical Society was formed in 1868, some fourteen years before the formation of the Society of Chemical Industry, of which it became a section in 1883. Three members of the original section committee still remain, one of whom is Dr. J. T. Dunn, the first hon. secretary and treasurer, who was unanimously elected president of the Society of Chemical Industry this week. Nothing therefore, could have been more fitting than that the Society should hold its fifty-second annual meeting at Newcastle. The local section has now had the honour of entertaining the Society on five occasions—in 1884, when Walter Weldon was president; in 1899, with Sir George Beilby in the chair; in 1908, under the presidency of Sir Boverton Redwood; in 1920, when illness prevented Mr. John Gray from fulfilling the presidential duties, his address being read by Professor Louis, his predecessor in office; and this year, with Dr. J. T. Dunn, the doyen of northern chemists, in the presidential chair.

Close upon 400 members and friends attended the Newcastle meeting, which was noteworthy not only because of the success of the detailed organisation but because of the introduction of three definite group conferences, concerned with chemical engineering, plastics and food respectively. The Newcastle Section, and particularly Professor G. R. Clemo, its chairman, and Mr. J. W. Craggs, its hon. secretary, are to be congratulated upon one of the most successful meetings in the half century history of the Society.

A Falling Membership

A CONTINUED decrease in membership was recorded in the annual report but the Council found consolation in the fact that the Society's loss in this respect was smaller in degree than that sustained by many scientific organisations and there were now signs of a steady increase in the stream of new members elected. Gaps caused by death last year reached the high figure of 56, and many of those whose names appeared in the list were notable figures in the history of the Society and the industry generally. Favourable accounts were given in the report of the progress of the subject groups and local sections, special note being made of the fact that the Food Group had already reached a membership of over 300.

The Jubilee Memorial Lectures are reported to have established prominence in the Society's work, and the Council announces in its report that during the coming session, Dr. F. H. Carr will lecture on "Biochemistry and the Manufacture of Fine Chemicals," before two of the local sections, and Dr. L. H. Lampitt, chairman of the Food Group, will lecture on "Some Fundamental Scientific Problems in the Food Industry," before three of the sections. Another note of interest in the report is the announcement that the 1934 meeting of the Society will be held at Cardiff, by invitation of the South Wales Section and will take place in the third week of July. This is the first occasion on which the Society has arranged a general meeting in Wales.

Consolidation of Chemical Societies

TWELVE months ago Professor G. T. Morgan devoted his presidential address to a survey of the possibilities of consolidating the chemical organisations of this country with a view to the elimination of wasteful overlapping of effort and expenditure. The annual report presented this week records that as an immediate result of Professor Morgan's address a widespread demand was created for an exploration into ways and means of bringing about such a consolidation. A committee was set up by the Federal Council for Chemistry and its report was presented to the principal interests concerned. The initial scheme recommended by the committee, though not regarded as perfect, received a considerable measure of support, but not sufficient to warrant steps being taken immediately to promote progress on the lines suggested.

A new committee has been formed to discuss the matter afresh, and it is hoped in due course to devise some means by which members of the various chemical organisations will secure a better combined service at less personal expense. The fact that both financially and from the point of view of membership the Society is not so strong as it was twelve months ago, is a sound argument in favour of some measure of amalgamation, and we shall watch with interest for the new committee's report.

Scope of the Papers

SELDOM, if ever, have the papers presented at the annual meeting of the Society of Chemical Industry covered so wide a range of subjects as they did this week. The development of the subject groups was responsible for this widening of the scope of the conference, for the Chemical Engineering Group, the Plastics Group and the Food Group each had a session of its own, while the president also specialised on his own particular sphere of chemical activity in his presidential address. His able and outspoken review of the industrial use of textiles on Tuesday morning was followed in the afternoon by the Chemical Engineering Group's study of the elimination of noxious constituents

from the Battersea Power Station flue gases and the allied question of the effect of sulphur gases upon dyed fabrics. On Wednesday, Dr. Herbert Levenstein addressed the Plastics Group on phenol and cellulose supplies, deputising at short notice for Professor B. Rassow, of Leipzig, who was to have spoken on plastic masses. On Thursday, the Food Group had a highly successful session, devoted to a series of four papers on wheat, meat, dairy products and fertilisers.

The group meetings were open to all members of the Society, and the large attendances testified to the interest which members took in chemical activities outside their own immediate spheres. A similar breadth of outlook was displayed in the compilation of the list of works visits, which embraced electrical supply, soap, pottery, heavy oil engine, coke and by-product, toffee, artifical silk and fertiliser manufacture.

The British Empire

BRITAIN is a manufacturing centre, the Empire is the development centre. A close realisation of the potentialities of the Empire coupled with a judicious extension of the brotherhood economically, if not politically, would provide the most valuable foundation for the future trade of the world. In every corner of the Empire, where travellers and adventurers formerly carried forward the flag, engineers, chemists, biologists, medical men and the like, are advancing the scientific development of those areas. The scientist will be followed by the factory; Britons who once stayed at home without ever leaving the borders of their home county, now regard a train journey of 1,000 miles in two or three days as common-place. The growth of Empire communication by the aeroplane will result in the next generation establishing their factories in the farthest corners of the world, and paying them frequent visits just as they now visit several branches or customers in England. The future of the Empire depends on communications and on the vision with which Britons the world over regard the potentialities of the wider spaces of the Empire. The period of unexampled American prosperity was that during which the undeveloped West served as a safety valve, "a region for hopeful restoration." There are still undeveloped places in the Empire, we have still our "regions of hopeful restoration" if we will learn how to use them.

The chemist and the engineer must take the predominant part in this reconstruction, and the rest of the world must be allowed to share so that undeveloped regions may eventually be used for the prosperity of all. The employment of mankind in the future depends on new manufactures, new uses, and new industries. If so much has been developed by those who have stayed at home, what may not be the result of large migration of scientific men and engineers into other parts of the world? We shall do well to realise how vast a range of products we can obtain from the remoter Britain beyond the seas and how much there is that we can supply them with. A careful study of the economic potentialities of the Empire will repay every manufacturer and business man, and this Empire on which the sun never sets and which could be made economically self-supporting. The existence of Empire markets is a fact and an opportunity which chemical manufacturers will not be slow to seize.

Aiding the Textile Industry

"THERE appears a lack of co-operation between producers and their Research Associations on the one side and industrial users on the other," said Dr. R. H. Pickard, F.R.S. in his presidential address to the Society. He was speaking on the industrial uses of textiles, for as Director of the Shirley Institute for Cotton Research, Manchester, he is one of the greatest authorities on textiles in the world. The variety of shade and the beauty of effects available in textiles constitute some of the greatest achievements of chemical science, but scientific methods can do little to aid the choice of materials judged on appearance. Choice is seldom based on durability or serviceability; it mostly lies in the feminine and, therefore, is often indeterminate, and to the textile producer it seems irrational. As an example of the application of newer knowledge, Dr. Pickard reminded the meeting of the exploitation of the intrinsic strength of cotton hairs, which has led to the production of strong tyre cords, and tyre canvas and made possible the high speed of motoring and durability of rubber tyres. For clothing the appearance of the fabrics which are offered for sale remains the dominant factor. In the case of textiles for industrial use the assistance that science could give both to producer and user is much greater in that it enables the producer to select different materials to build up a fabric to meet the users demand for a cloth to give a previously specified performance. It therefore, appears that for many industrial purposes there may develop a more advantageous use of textile fibres for a special performance, but we realise that this demands much investigation. The surface properties of the cellulose fibres may, in the near future, be further elucidated with results more fruitful in suggestions to textile practitioners by the quite new technique of electron diffraction. This gives information of a similar kind to that given by X-rays, but with the important difference that a much smaller thickness of material is effective in producing the diffraction pattern. The next technique, however, is complicated, and the interpretation of the patterns obtained is not at present so clearly understood as are those obtained by X-rays. Nevertheless they should be of great value in the textile world.

Courage

As manufacturers we are often loud in our praise of a new piece of plant or equipment which is our very own production; if we were not, we could not be regarded as sanely human. But as possible users of that plant we are sometimes a little too sceptical of the claims which are laid forth in respect of it. We investigate its worth, presumably because we have need to adopt it, but only in those cases of dire necessity do we take courage and try to benefit by the experience which the plant manufacturer has put into his design and construction. Of course, there are those who take the risk of installing it, and they are good fellows to the industry. The remainder merely wait in anticipation of the welcome cooing which signifies that the plant is good, but when there comes a rumour that the plant has not justified the claims which have been made for it, these fellows shake their heads and congratulate themselves on being wise old owls to profit by the experience of others.

The Society of Chemical Industry

Fifty-Second Annual Meeting at Newcastle

THE fifty-second annual meeting of the Society of Chemical Industry was held at Armstrong College, Newcastle-upon-Tyne, from July 10 to 14, under the presidency of Dr. R. H. Pickard. Commencing with an informal reception at the College on Monday evening, the programme comprised, in addition to the general meeting, sectional conferences of the Chemical Engineering Group, Plastics Group and Food Group, a civic reception at the Laing Art Gallery, the annual dinner, a reception by the chairman, principal and council of Armstrong College, and visits to a number of industrial undertakings and beauty spots in the North East Coast area.

ASSEMBLING in King's Hall on Tuesday morning, July 11, the members and visitors were accorded a hearty welcome by the Lord Mayor of Newcastle and the principal of Armstrong College.

The LORD MAYOR (Dr. J. W. Leech, M.P.) said it was appropriate that the Society, which had visited Newcastle in 1920, should come again, for men of the Newcastle area had played a not inconsiderable part in the progress of science during recent years. They were men gifted with that genius which had been the means of uplifting the people, and the results of their researches had advanced civilisation and had benefited mankind. After congratulating Dr. Pickard upon the success with which he had presided over the destinies of the Society during the past year, the Lord Mayor congratulated his old friend, Dr. J. T. Dunn, of Newcastle, president-elect. The Society was to be congratulated heartily upon having elected to the office of president a man who, by virtue of his past life and experience, was so well able to carry the load of that office. He was taking upon himself a great trust and a great responsibility; he could carry it!

Dr. R. H. Pickard, F.R.S.
President of the Society of Chemical Industry

SIR WILLIAM MARRIS (principal of Armstrong College) said that both as a representative of Durham University and the principal of Armstrong College, he was glad to have the opportunity of expressing a welcome to the Society. It was a great pleasure to know that the Society had come to the college for its meetings, for the college had always maintained a close interest in and had done much work in those regions in which the Society was interested.

DR. PICKARD, proposing a vote of thanks to the Lord Mayor and Sir William Marris, said the members were indeed gratified by the reception accorded them. They were not surprised by the warmth of the welcome, for they were familiar with the records of previous successful meetings in Newcastle He recalled with great pleasure the services rendered to the profession of chemistry and to chemical industry at large by Professor Bedson, who was previously professor of chemistry at Armstrong College; and he expressed best wishes to Professor Clemo, who now occupies the chair of chemistry there.

Election of Officers

The PRESIDENT submitted the name of Dr. J. T. Dunn as president of the Society for the year 1933-34. The Council he said, had had the great advantage of Dr. Dunn's advice for some time, and felt that his election would ensure that the work of the council and the traditions of the Society would be in safe hands.

The motion was carried unanimously.

DR DUNN said that the honour was particularly acceptable to him, for two reasons. The first was that he believed his nomination by the council was unanimous, and his election appeared to be equally unanimous on the part of the annual general meeting. The second reason was that he had been connected for a very long period with the Society. He had filled practically every office in the Society except those of hon. treasurer and president. He had its interests very much at heart, and though he recognised strongly the great responsibility which fell upon him in accepting the latter office, and the difficulty of maintaining the standard set by many eminent predecessors, no effort would be spared by him in maintaining that standard.

The four vice-presidents to retire were Mr. W. A. S. Calder, Dr. H. Levinstein, Dr. F. L. Pyman and Mr. H. Talbot. Their places were filled by the election of Dr. R. H. Pickard, Dr. J. B. Firth, Mr. F. A. Greene and Mr. Edwin Thompson. Four vacancies on the Council (due to the retirement of Mr. F. W. Bain, Mr. F. A. Greene, Dr. L. A. Jordan and Dr. L. H. Lampitt) were filled by the election of Col. E. Briggs, Dr. T. Callan, Mr. J. H. Leonard and Mr. A. A. King. The following were re-elected:—Hon. treasurer, Dr. R. T. Colgate; hon. foreign (or overseas) secretary, Dr. E. F. Armstrong.

The Annual Report

The Council reported that members on the register at July 11, numbered 4,333, as compared with 4,410 at July 13, 1932. The loss in membership was less than that recorded in 1932. A large proportion of those whose names had disappeared from the register were from countries overseas where the financial depression probably arrived later than it did in Britain. It was not possible to state that the lowest point in the decline had been reached: industrial recovery was sluggish and the effects of world depression were slow to mend. It was, however, a satisfactory sign that the stream of new members elected was steadily increasing and when it was augmented by those who resume membership laid down during these years of financial stress the losses, which the Society had sustained in a much smaller degree than many scientific organisation would be fully recovered. Since the last annual meeting 274 members had been elected, fourteen members and been restored, and the losses through death, resignation, etc., had been 365. The membership during the past six years has been as follows:—1928, 4,648; 1929, 4,550; 1930, 4,596; 1931, 4,541; 1932, 4,410; 1933, 4,333.

Gaps caused by death reached the high figure of 56, and many of those whose names appeared in the list were notable figures in the history of the Society, industry or profession.

Since the annual meeting of 1932 such improvement as had taken place in the industrial position had not yet reacted on the status of the large number of chemists who had suffered by the depression; it might be some years before many of those who had recently reliquished membership would return to the ranks. There were, however, a large number engaged in the many branches of applied chemistry who did not support the Society by membership or subscription. Members could help themselves and their Society by bringing home to such chemists the fundamental importance of the Society's work to their profession or industry.

Dr. R. T. Colgate had accepted the position of hon.

treasurer for the fourth successive year, and Dr. E. F. Armstrong, had again been elected to the office of hon. foreign (or overseas) secretary.

All local sections had carried out extensive programmes and further progress was recorded in the practice of arranging joint meetings with the subject groups and with such other societies as had an interest in the subjects discussed. This would result in fewer papers of higher quality with a corresponding saving and improvement in the literature. The three subject groups had each carried out a vigorous campaign and evidence of the vitality of this phase of the Society's work would be given during the annual meeting when each group would take charge of one session and present several papers for discussion. That the merit of the groups' work was widely appreciated was shown by the numerous invitations to conduct joint meetings with other societies. The rapid increase in membership of the Food Group, which in its second year exceeded 300, was clear proof of the need for such an organisation. The membership roll contained many names not previously on the register of the Society. A strong programme had been arranged for the coming session. The Council welcomed the international character of the symposium on "Bread" and "Milk" to be held in London next November.

The Plastics Group took a prominent part in organising the six months' exhibition of plastics in the Science Museum. A series of fourteen well attended weekly public lectures had done much to widen knowledge on the various types of plastic materials and their application.

The Fuel Committee had been consulted by local officials and had assisted in arranging addresses before the sections concerned. The committee had rendered valuable assistance to the British Standards Institution on the sub-committees of which its members had been strongly represented. Dr. E. W. Smith retains the chairmanship and Mr. H. H. Hollins the hon. secretaryship.

Publicity

The efforts made during the jubilee celebrations and in the following year to make the character of the Society's work more widely known and to create an appreciation of the value of chemistry to industry generally had been continued during the past year. The publication committee under the chairmanship of Mr. H. Talbot had worked diligently to establish a technique and this appeared now to be producing definite results. It was possible to attribute the interest of many new members to the work of the committee which again showed its value in the extent to which the Society was consulted by other organisations, the Press, technical committees and similar bodies.

Consolidation of Chemical Associations

As an immediate result of Professor Morgan's presidential address a widespread demand was created for an exploration into ways and means of consolidating and reducing the administrative expenditure of the principal chemical organisations. A committee was set up by the Federal Council and its report was presented to the principal interests concerned. The initial scheme recommended by the committee, though not regarded as perfect, received a considerable measure of approval by the Council and that of other societies but did not secure sufficiently unanimous support to warrant steps being taken immediately to promote progress on the lines suggested. A new committee had been formed to discuss the matter afresh, and it was hoped in due course to devise some means by which members of the various chemical organisations would secure a better combined service at less personal expense.

Annual Meeting, 1934

The Council will accept an invitation from the executive of the South Wales Section to hold the meeting in South Wales, with headquarters at Cardiff, in the third week of July, 1934.

On the motion of Mr. J. W. Craggs, seconded by Mr. E. F. Luke, Messrs. Price, Waterhouse & Co. ((Chartered Accountants) were re-elected auditors to the Society.

Vote of Thanks

Dr. Dunn proposed a vote of thanks to the officers of the Society and the staff for their work during the past year. He referred particularly to the zeal with which Dr. Pickard had carried out the duties of the presidency. Again, the vice-presidents and members of council had attended to their duties so assiduously that it was difficult to find a seat in the council chamber unless one came early. The presidents and hon. secretaries of the sections had been of the greatest assistance, for they were the nerves of the Society, by which to learn the views of the members in distant parts of the Country. Others whom he mentioned particularly were Dr. Colgate (hon. treasurer), Mr. H. J. Pooley (general secretary), and Dr. Miall and Dr. Burton.

The vote of thanks was seconded by Mr. W. A. S. Calder, and carried with acclamation.

The Industrial Uses of Textiles

Dr. R. H. Pickard's Presidential Address

THE variety of shade and the beauty of effects available in textiles constitute some of the greatest achievements of chemical science. But, said Dr. Pickard, scientific methods can do litte to aid the choice of materials judged on appearance—the choice is seldom based on durability or serviceability—it mostly lies in the feminine, and therefore is often indeterminate.

For underwear, however, the choice of a textile is becoming rather more rational—the shopper does now consider the weight per yard, the porosity, the probable behaviour in the laundry, and the useful life of garments on sale—appearance and price have ceased to be the all-dominant selling points. Not only is there a greater choice of fibres available, due, for example, to the introduction of different kinds of viscose and of cellulose acetate, but also in the case of each individual fibre there is an appreciation of the physical and chemical properties of the numerous varieties of each fibre.

For clothing the appearance of the fabrics which are offered for sale remains the dominant factor. In the production of clothing fabrics science has played a prominent part in aiding the efforts of the technologists to produce pleasing effects, but it cannot alter the customer's choice, which is guided mostly by the dictates of fashion. In the case of textiles for industrial use, however, the assistance that science could give both to producer and user is much greater in that it enables the producer to select different materials to build up a fabric to meet the users demand for a cloth to give a previously specified performance.

In order that the best use should be made of all textiles, a knowledge of the special characteristic qualities of each of the different fibres, in their farious modifications, is necessary. Thus cotton in the higher qualities is distinguished by strength, flexibility, stability of structure, and dimensions, resistance to chemicals, and durability in wear. Linen has similar properties, with less flexibility but rather greater strength, though the difference is small in cloth of comparable qualities. Wool has high extensibility and covering power with fireproof qualities. Silk can be woven to extreme fineness with great strength and, like wool, is very resistant to creasing and loss of shape. Rayon also makes thin, smooth cloth at a lower price with less perfect elasticity; acetate rayon absorbs little moisture from a damp atmosphere, and the same is true to a lesser extent of the newer kinds of esterified spun cotton.

Fabric structure allows a great deal of latitude in meeting any demand for variations in the degree of anisotropy, particularly if different textiles can be used. Along warp or weft it may be stronger or weaker extensible, flexible, or rigid, conducting or insulating whilst the two faces, notably in a satin weave, may be entirely different. It follows that the choice of fibres and threads for warp and weft in any fabric for industrial use should be independent and made with regard to the demands on each. There is already some evidence of rational design on these lines, more particularly with the new artificial filaments, but tradition reserves Manchester for cotton, Bradford for wool, Belfast for linen,

Dundee for jute, and the producers in each locality prefer to make the best shift they can with their own fibre. It would be preferable in the future, having determined with precision the characteristics of each fibre and learnt the processes by which they can be modified, to combine them in a cloth designed to give any performance desired.

Recently the Faraday Society brought together in Manchester a great meeting of colloid chemists and physicists of international reputation to discuss the colloid aspects of textile materials. Among the listeners were many occupied in the production of textile materials and many of us were perplexed and bewildered to find the speakers and writers of papers using the name cellulose so very loosely. The term "cellulose" was used indiscriminately in a chemical and physical sense as a synonym for raw cotton, bleached cotton, linen, mercerised cotton, ramie, viscoses of the different types, and for the larger radical in the esters and ethers now coming into so many uses. This frequent failure on the part of some academic workers to characterise the type of cellulose material used in their researches may be due to the type of such work. The X-ray examination of fibres leads to the production of an X-ray diffraction pattern which necessarily involves diffraction of the radiation from a volume of the substance. In other words, the structure examined by X-ray analysis is that of the bulk of the substance. Thin layers of a substance different from the bulk or small but nevertheless important structural differences that might occur at a surface would not be indicated by this method.

The surface properties of the cellulosic fibres may in the near future be further elucidated with results more fruitful in suggestions to textile practitioners by the quite new technique of electron diffraction, giving information of a similar kind to that given by X-rays but with the important difference that a much smaller thickness of material is effective in producing the diffraction pattern. Layers with a thickness of about 10^{-6} cm. containing (say) some 10 molecular layers have been used. This new technique, however, is complicated—much more so than that of X-rays—and the interpretation of the patterns obtained is not at present so clearly understood as those from the X-rays, but it is quite conceivable that the method could be used for example to examine size films on yarns or the films produced by the various finishing processes on cloth. There is also another branch of physics now being developed which may one day be of practical application in the textile world. Molecular rays have up to the present been used chiefly for studying the properties of atoms or molecules of substances which can be obtained in the vaporised state, such as the metals, the common gases, a few inorganic salts, and some organic liquids; but just as X-rays and electron beams give diffraction patterns, so do beams of molecular rays and indeed certain workers are already experimenting with them for this purpose. At present the interpretation of the patterns is extremely difficult, but if this difficulty is overcome it is not outside the bounds of possibility to imagine this technique ultimately being applied for the routine examination of extremely thin surface films, thinner than those which can be examined by slow electron beams. Such a technique might well find application in textile research.

As an onlooker Dr. Pickard thus attempted an assessment of the present value of some of the more fashionable and exciting branches of modern physics to the textile industry—not in any way to decry their potential or problematical usefulness, but rather as a respectful hint to the Universities that with a general revival of trade, not only of the textile industries but generally, there may arise an all-round demand by industry for well-trained physicists not so accurately classifiable by the irreverent as more specialists who are only atom smashers or X-ray merchants!

DR. L. H. LAMPITT, chairman of the Food Group, proposing a vote of thanks to the President for his address, commented particularly upon its intensely practical nature, and said that it demonstrated the necessity for regarding science as a whole. The old divisions were breaking down. Dr. Pickard had indicated a field which showed the necessity for scientific investigation, not with the object of curtailing labour, but in order to develop various sides of the textile industry and produce fabrics applicable to commercial use. One saw in that a field which would occupy chemistry for a number of years.

The vote of thanks was carried with acclamation.

The Chemical Engineering Group Session

Treatment of Battersea Power Station Fumes

MR. J. ARTHUR REAVELL presided at the Chemical Engineering Group Session of the annual meeting of the Society of Chemical Industry at Armstrong College on Tuesday afternoon, when Dr. S. L. Pearce presented a paper by G. W. Hemson, A Pollitt, R. L. Rees and himself on "The Application to the Battersea Power Station of Researches into the Elimination of Noxious Constituents from Flue Gases and the Treatment of Resulting Effluents."

Dr. Pearce said that, when permission was granted in 1927 for the erection of the Battersea Power Station, it was laid down that the company should take "the best known precautions for the due consumption of smoke and for preventing, as far as possible, the evolution of oxides of sulphur, and generally for preventing any nuisance arising from the generating station or from any operations thereat." This really meant the suppression of smoke, the removal of dust, and the elimination of oxides of sulphur from the flue gases. This last requirement presented a new and very serious problem. The rate of flow of flue gas from the station when completed would be 1,500,000 cubic feet per minute, and it had been found possible to reduce the concentration of sulphur dioxide in the gas by nearly 95 per cent. The methods used were: (1) treatment of the coal; (2) dry treatment of the gas; and (3) wet treatment of the gas.

"A cleaning process may pay for itself," said Dr. Pearce, "by increasing boiler efficiency and reducing boiler maintenance and transport charges. In such circumstances it is doubly advantageous to clean the coal." He outlined the various experimental methods which had been tried as, for instance, the addition of lime and chalk to the coal during combustion, and related how a small tower had been built, in which experiments were carried on in washing the gas with water in contra-flow. These experiments had proved that a water-to-coal ratio of about twenty is desirable, the great part of the washing must be carried out in contra-flow, the gas and liquid must be made turbulent by passage of the liquid over baffles, the gas must have an adequate time of passage through the washer, some steel filling is desirable to produce iron salts and promote oxidation, and that provision should be made for a final spraying with alkali in case of necessity.

In the washing process described, the flue gas was scrubbed with water drawn from a canal. Two methods of oxidation were available; first, where the oxygen was supplied by an "oxidising agent," and secondly, where oxygen was supplied from the atmosphere. A modern power station must pass through its condensers from 400 to 500 tons of cold water per ton of coal burned. At Battersea, the effluent is mixed with the condenser discharge to meet the wishes of the Port of London Authority. Thames water at Battersea generally contains only a small fraction of the saturation value of dissolved oxygen, apparently owing to the discharge of sewage into the river. Hence the effluent from a gas washing process must be oxidised before discharge. Soda-ash is unlikely to become an economic washing agent until some convenient method re-generating it can be discovered, preferably with the production of a marketable by-product.

Dr. Pearce then described the flue gas washing plant at Battersea, with its nine boilers. The coal consumption of each was 19 tons per hour, whole the total weight of gas was approximately 3,600,000 lb. per hour. He described how eliminator banks are arranged in the giant chimneys, and summarised the process for removing sulphur oxides as being one in which the gas was washed with water during its passage through scrubbers in which both gas and water were brought into contact with iron oxide. The gas was then scrubbed, in

contra-flow, with wooden scrubbers, and finally it was scrubbed with an alkaline solution and discharged through a dry scrubber.

Following Dr. Pearce's presentation of the paper, Mr. A. T. King, of the Wool Industries Research Association, presented a contribution on "The Fading of Dyed Fabrics under the influence of Sulphur Gases in the Atmosphere." The town-dwelling public, he said, knows only too well the dingy effect of smoke on buildings, paint work and house furnishings, and the necessity of frequent recourse to laundry and dry cleaner to renovate smoke-soiled clothing. That smoke abatement would be a boon in such respects needs no argument. Apart from obvious disadvantages of this sort, however, there is in particular one more subtle influence which is often the cause of disappointment to the owner of a suit or costume at the failure of the dry cleaner to restore the garments to their pristine brightness and original shade. This is the gas, sulphur dioxide, which, owing to the circumstance that sulphur is a normal constituent of coal, is always present in the fumes from burning coal.

Such a statement may seem an anomaly in view of the fact that in the wool industry sulphur dioxide is frequently employed to advantage in conjunction with the dyeing of fabrics. The stoving process, which has for long been an important method of bleaching wool and wool fabrics consists essentially in the exposure of the goods to sulphur dioxide gas by hanging them in the old-fashioned fumigation of rooms after infectious illness. No doubt many who have had occasion to carry out this disinfection have afterwards observed with puzzled surprise, changes in shade in some dyed fabric or other among the furnishings.

The essential reason for stoving in connection with dyed goods is the fact that wool being naturally yellowish in colour, pure pastel shades cannot be obtained—for example a pale blue dyeing will come out greenish in shade—unless the yellow undertone of the wool is removed. For technical reasons the stoving is performed *after* the dyeing, so it will be seen that the dyes used must be guaranteed "fast" to stoving. Hence practically all important dyestuffs are scheduled according to their degree of fastness to stoving and for dyes recommended as especially suited to this particular purpose, their fastness to stoving is even more important than their fastness to light. Also for general purposes the dye user though naturally more concerned as to the fastness to light, will prefer, other things being equal, a dye resistant at the same time to sulphur fumes. It has also been natural for him to assume that a dye described as reasonably, though not fully resistant to the drastic stoving test, would be safe under conditions where only relatively small quantities of sulphur dioxide were present.

Unfortunately for such calculation, a further apparent anomaly has come to light as a result of the research work on the action of sulphur dioxide on dyestuffs, that circumstances can, and frequently do, obtain under which not only dyeings of moderate fastness to stoving, but many dyeings unaffected by the stoving process, suffer marked alteration in shade through contamination with mere traces of the gas. Sulphur fumes from coal is but one of many possible sources of such contamination, but it will be realised that its elimination is in the public interest.

Points from the Discussion

Mr. G. MONHEBEL (Imperial Chemical Industries, Ltd., Billingham) complimented Dr. Pearce upon having reduced the sulphur emission to about one-hundredth of that permitted under the Alkali Act. Extensive experimental work had been carried out at Billingham, at a result of which they had attained a dust removal of 99 per cent. and a sulphur removal of 98 per cent.

Dr. R. LESSING, while welcoming the success of sulphur removal from the atmosphere, said the effluent problem was a serious one, especially in the case of a drought such as that experienced in the summer of 1929. Something would have to be done to prevent the discharge of effluent into rivers, and he looked forward to the time when a large power station like that at Battersea could be provided with plant which would entirely eliminate such a discharge into the river.

DR. PEARCE, in replying to the discussion, said the total capital and operating cost of the plant described in his paper was 1s. 3d. per ton of coal consumed. Critics of the Battersea scheme had suggested that it would have been cheaper to put the power station 15 or 20 miles further down the river, but the cost of transmission, transformers, etc., would have amounted to 5s. per ton of road consumed, so that there was a direct advantage of 3s. 9d. per ton. Even if they had built an inferior type of power station, as had been suggested, there would still have been an advantage of at least 1s. 6d. per ton of coal consumed.

The Plastics Group Session

Dr. H. Levinstein Reviews the Phenol Situation

A MEETING arranged by the Plastics Group of the Society was held on Wednesday morning. Mr. H. V. Potter, chairman of the Group, presided. It had been arranged that Professor B. Rassow, of Leipzig, should present a paper on "Plastic Masses: Their Physical Importance and Applications," but circumstances arose which prevented Professor Rassow's attendance at the meeting. Dr. H. Levinstein, past-president of the Society, however, presented a paper in which he surveyed the subject of phenol supplies and cellulose, the two main raw materials for the phenolic plastics.

Dealing first with cellulose supplies, Dr. Levinstein pointed to the fact that the consumption of wood in the world was greater than the annual increment by natural growth. At the present rate of consumption and with the present forestry methods, the available soft wood supplies of the United States and Canada would become exhausted. In any event, the greatest reserves of soft wood in the world were in Russia—a matter of political as well as of economic importance. There was no reason to fear a shortage of wood pulp, however; the natural growth of existing forests was amply sufficient but for the voracious building trades, which used seven times as much wood as that used for making pulp. As the consumption of wood for building diminished, the supply of wood for making pulp for paper, artificial silk and plastics, became, in the absence of any new factor, automatically more secure.

The case was different, however, in regard to the supply of coal tar phenol, which during the last 30 or 40 years had been subjected from time to time to wide fluctuations of price, caused by either a temporary surplus or shortage of supply. The price of phenol at the moment is about 9d. per lb. The normal price could be taken as averaging between 5½d. and 6½d. per lb. in this country.

The time was now ripe for the manufacture of synthetic phenol in this country. During the war large quantities were made, but there was none made at present, nor was the manufacture carried on in Germany to any substantial extent, if at all. The home of the synthetic phenol industry was America, where benzol was cheap because petrol was cheap. The plant required was simple, the process well-known, while it afforded an admirable outlet for caustic soda and for either sulphuric acid or chlorine. In America, 80 per cent. of the phenol produced was made synthetically. The cost of producing synthetic phenol here, if benzene were the same price in England as in America, would be about 4d. per lb., whether the chlorbenzene or the sulphonic acid method were used. Both methods worked well. The choice must be determined by the plant available, and one must also consider whether it was more desired to dispose of sulphuric acid than of chlorine. Every effort should be made to secure from the Government conditions under which the new industry could have its benzene under the same natural conditions as did the Americans. Given a free supply of phenol at a price of about 5½d., it might well be that the phenolic plastics would take their place as a material of great world importance. Clearly, coal tar phenols and cresols did not offer a sufficiently assured supply to permit of great development. The quantity of synthetic phenol which could be produced

and its cost price depended on the supply and the price of benzene. As benzene was also a by-product, it was not available in an unlimited quantity. He gave figures, however, from which he concluded that there was available in this country enough benzene to make 20 or 30 times the quantity of phenol now obtained from coal tar acids.

The petrol imports into this country amounted to about 25 times the total amount of benzene that we could produce at present, and nearly 60 times the amount of benzene we actually produced in 1931. From this it was evident that the national importance of home-produced benzene as a motor fuel was, and must remain, comparatively insignificant. It was of much greater national importance to encourage the use of benzol in the chemical industries, such as the dyestuffs, or in a new industry, such as the plastics, for by so doing we employed plant, labour, capital and relatively large quantities of heavy chemicals. The development of the plastics industry on a large scale, using British benzol as its main raw material, would be of great importance to all interested in the disposal of sulphuric acid, or chlorine, and of alkali. The development of the manufacture of an organic chemical in quantity was the most dependable, as it was the most profitable and intelligent way of expanding the market for the heavy chemical industries. The conditions seemed favourable for developing an industry already becoming a large one in the United States, but for the duty on imported motor spirit here.

Once trade was lost it was not readily recovered, and it was absurd to take up the manufacture of a product years after the cream had gone. Trade began where conditions were favourable, and he urged that the chemical industries be given every opportunity at this stage to sucure a fair share.

Points from the Discussion

Dr. L. A. JORDAN, director of the Research Association of British Paint, Colour and varnish Manufacturers, said that the duty on white spirit and turpentine had an interesting connection with the plastics industry. For example, turpentine was a raw material for synthetic camphor; synthetic camphor meant celluloid, and celluloid was a plastic. But he was not sanguine about the authorities seeing reason with regard to the duty.

Mr. H. TALBOT emphasised the importance of obtaining figures from almost every country likely to be concerned with the particular activity with which one was dealing, upon which to base arguments and form policies. The League of Nations organisation was building up an economic and statistical service which would in time, he believed, produce figures valuable for this purpose. He felt there might have to be some internationally planned economy to deal with industries applicable to the majority of civilised nations in the world; then the information provided by the economics and statistical branch of the League of Nations would form the basis of any action decided upon.

Mr. GRANT HOOPER suggested that possibly in future we might have to consider "home-grown" cellulose. It had always seemed wicked that we should sacrifice a tree, which took years to develop, when we could grow cellulose at home quite readily. He understood that one company had found it profitable to devote attention, not to the production of such cellulose as was indicated by wood pulp, but rather to the production of fibres, which commanded a much better price.

Dr. F. H. CARR, past-president, joined in the discussion for fear that some of those attending the meeting might be depressed by what had been suggested as to the possibilities of influencing the Treasury to act with regard to the duty on benzol used in the chemical industry. It was up to the chemists to bring this matter before the public over and over again, so that our legislators might be forced to understand it.

Major KNOWLES said that the shortage of supplies during the last two or three years had not been confined to this country, but had been international, and one reason for it was that the Japanese had been in the market for unprecedented quantities. For what purpose they needed it he would leave others to guess.

Dr. LEVINSTEIN, in a brief reply, said he had made no attack on the phenol makers, nor had he said that there had been a serious shortage. His figures were obtained from reliable sources, and he must regard them as accurate; if they were not, then he hoped the inaccuracies would be indicated.

On the motion of Dr. Pickard, a vote of thanks was accorded Dr. Levinstein for his paper.

Speeches at the Annual Dinner

Professor W. A. Bone Receives the Society Medal

ON Wednesday morning the Society Medal—which has been awarded at two-yearly intervals since 1896 to chemists of exceptional distinction, as selected by the Council—was presented to Professor W. A. Bone, head of the Department of Chemical Technology at the Imperial College of Science and Technology. The presentation was made by Dr. Pickard, the retiring president. Following the presentation, Professor Bone delivered an address on "Forty Years of Combustion Research," which will be reported in THE CHEMICAL AGE next week.

The annual dinner of the Society was held at the New Assembly Rooms, Barras Bridge, on Wednesday evening, when Dr. R. H. Pickard presided over a gathering of about 300 members and visitors, the latter including the Lord Mayor and acting Lady Mayoress of Newcastle.

SIR HENRY FOWLER, who proposed the toast of "Chemistry in Industry," said he particularly appreciated the extent to which the work of the chemist entered into that branch of industry represented by the railways. Most of the railways had their own chemists who dealt with such varied matters as water and lubrication. One of the greatest advances they had made in the sphere of lubrication was the use of superheated steam. For many years they were unable to use superheated steam because they had not the lubricant which would allow of its proper application. Industry also owed a debt of gratitude to chemistry for its development of the use of ethyl and the difference it had made in petrol consumption and the way in which petrol was used. Congratulating Dr. Pickard upon his successful year of office, he mentioned that both the president and himself were at one time students with Sir William Tilden. No one had done more to promote the relations between chemistry and industry than Dr. Pickard had done.

DR. R. H. PICKARD, responding to the toast, acknowledged the debt which he, in common with Sir Henry Fowler, owed to Sir William Tilden for initiating him into chemistry. The Society of Chemical Industry did not only concern itself with the manufacture of chemicals. During the war, and since, he believed there had been a much more universal recognition of the part which chemistry played in the national life. Although that was widely recognised he was convinced that it was becoming increasingly recognised by that hypothetical individual, the man in the street, with whom ought now to be coupled the woman in the street. The Society did not concern itself with the application of chemistry to any one manufacture or industry; this was demonstrated by the fact that something like 26 different sections were catered for in the records of its activities. There was a scheme afoot for the reorganisation of the chemical societies, and he was hopeful that the object outlined by Professor G. T. Morgan in his presidential address at Nottingham last year would ultimately be achieved, to the advantage of the chemical profession and industry as a whole. The Society, he was pleased to say, was in a flourishing condition. The application of chemistry to industry depended upon the prosecution by the chemist of further research work, and he believed the Society was destined to play a leading part in such further advancement.

DR. L. H. LAMPITT, chairman of the Food Group, proposed the toast of the guests, of whom, he mentioned, the chief was the Lord Mayor. He also referred to the presence of Professor H. E. Armstrong, the doyen of British chemistry,

Professor Thorpe, president of the Institute of Chemistry, and Professor G. T. Morgan, president of the Chemical Society. The members of the Society were looking to the two latter, in conjunction with their own president, to bring the chemical organisation together. They did not only want to see committees appointed, but they desired something to be done, and they looked to them for action. The Society was also honoured that night by the presence of many representatives of industry, to whom they looked to provide the sinews of war.

The LORD MAYOR, in responding to the toast, said the North East coast and South Wales were the most distressed areas in the country to-day, and they welcomed the members of the Society amongst them to help in the solution of their problems. He knew of no body of men more likely to help them than the Society of Chemical Industry. Its work from beginning to end was research. He was gratified to learn that the unemployment figures had been reduced and he believed we were on the eve of a great revival and that the rebuilding of our country had already begun.

PROFESSOR H. E. ARMSTRONG, also responding, said we had developed the machine at the expense of the man, and on occasions like that they ought to take every possible advantage of the opportunity to proclaim the fact to the public. We were suffering to-day from a great lack of intelligence. In the recent deliberations of the World Conference in London there had been no sign of intelligence; no sign of a right understanding of what was wrong with the world. He congratulated the Society upon having Professor Bone as this year's Medal Lecturer, and he complimented his friend, Dr. J. T. Dunn, upon his election to the presidential chair.

MR. L. E. WESTMAN, editor of "Canadian Chemistry and Metallurgy," also responded to the toast.

DR. J. T. DUNN, the new president, proposed the toast of his immediate predecessor, and said he had been filled with admiration of the manner in which Dr. Pickard had discharged his duties during the past year. The council meetings under his presidency had been short and harmonious.

DR. PICKARD, in response, took the opportunity upon the conclusion of his term of office of thanking all the officers of the Society for their excellent work. He also thanked the local section for organising the annual meeting.

Presidents, Past and Present

Dr. Pickard and Dr. Dunn

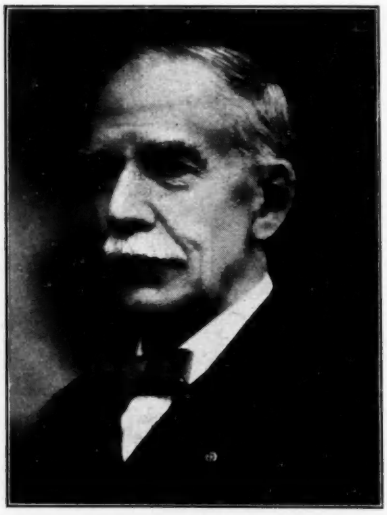
DR. ROBERT HOWSON PICKARD, F.R.S., whose term of office as president of the Society of Chemical Industry has been completed this week, is 59 years of age and is the director of the Shirley Institute of the British Cotton Industry Research Association, having succeeded the late Dr. A. W. Crossley in that office in 1927. He was educated at King Edward's School, Camp Hill, Mason University College and the University of Munich, and is a graduate of the University of London (D.Sc.), of the University of Munich (Ph.D.) and of the University of Birmingham (B.Sc.). He was elected a Fellow of the Royal Society in 1917.

Dr. Pickard went to Manchester from the Battersea Polytechnic, of which institution he was principal from 1920 to 1927. In addition to the heavy responsibilities of that post, he acted as director of research for the British Leather Manufacturers' Research Association. He has served on the Councils of the British Launderers' Research Association and the Boot and Shoe Research Association, and on the Adhesives Committee of the Department of Scientific and Industrial Research. Besides being a senator of the University of London, a recognised teacher of organic chemistry there and a member of its Standing Committee of Convocation, Dr. Pickard has acted as occasional examiner for higher degrees at the Universities of St. Andrews and Birmingham. He has served as a nominee of the President of the Board of Education on the examination board of the City and Guilds of London Institute, as well as on the board of examiners of the Institute of Chemistry.

Dr. Pickard was formerly head of the chemical department of the Blackburn Municipal Technical College from 1899 until his appointment as principal of the college in 1905, a post which he held for fifteen years. He has also served on the Council of the Textile Institute at Manchester. He was chairman of the Manchester Section of the Society of Chemical Industry from 1929 to 1931.

Dr. J. T. Dunn

By the election of Dr. J. T. Dunn, F.I.C., as president for the year 1933-1934, the Society has selected one who has had a unique experience of scientific activity. He will bring to the Society the academic knowledge of a student and a teacher combined with the practical ability born of a long association with the commercial and official aspects of chemical work. Dr. Dunn graduated from what is now Armstrong College, University of Durham, Newcastle, in 1877. He was later first Pemberton Fellow of the University and demonstrator in chemistry and physics. In 1883 he became science master of Gateshead School and after only three years in that capacity he was appointed headmaster. Leaving Newcastle in 1894 he was in turn head of Plymouth Technical School and principal of the Northern Polytechnic, Holloway, where he superintended the erection of building, appointed original staff and arranged equipment and curricula. He remained in the south until 1901. Then he returned to his native town to join, as partner, the firm of J. and H. S. Pattinson and Co., consulting and analytical chemists. Some years later, in 1912, he became sole principal on the death of Mr. John Pattinson. In the same year he was appointed public analyst



Dr. J. T. Dunn, F.I.C., the new President of the Society of Chemical Industry

for the county of Northumberland, Newcastle, Gateshead, Sunderland, South Shields, Tynemouth and Berwick, which office he still holds.

It was Dr. Dunn, then hon. secretary and editor of "Transactions" of the Newcastle Chemical Society, who took a great part in the negotiations to bring about the amalgamation of that body with the Society of Chemical Industry in 1883. He has twice been chairman of the Newcastle Section which was formed by this amalgamation, also a member of council and a vice-president of the Society. Dr. Dunn is a member of council of the Society of Public Analysts, whose president he was in 1930-1932. Among his many activities Dr. Dunn has taken part in the work of the Committee on Arsenical Poisoning which was appointed in consequence of the "arsenic scare" in 1901, and has server on committees of the British Association, the Fuel Research Board, and British Standards Institution. He now represents the Fuel Research Board on the North Eastern Coalfields Survey. A member of the council of Armstrong College, vice-president of the Newcastle Literary and Philosophical Society, Dr. Dunn is a J.P. for the county borough of Gateshead.

Newcastle Section Luncheon

Presentation to Dr. J. T. Dunn

THOSE attending the meeting were invited to luncheon, at the Grand Assembley Rooms, on Tuesday, by the Newcastle Section of the Society. Professor G. R. Clemo, chairman of the Newcastle committee, presided.

DR. PICKARD proposed the toast of the Newcastle Section, its officers and committee, and thanked them for their kind hospitality. The Newcastle Section, he said, had always been one of the most vigorous sections; it prided itself that when its predecessor, the old Newcastle Chemical Society joined the S.C.I., it doubled the Society's membership.

PROFESSOR CLEMO, in his response, said that the Newcastle Section was proud of its record, and was particularly pleased that its most active member had been elected president of the Society. Dr. Dunn was a pioneer of co-operation, and one looked forward to striking results from his efforts in the near future. Professor Clemo paid a tribute to Mr. Craggs and Dr. Stephenson for having done the lion's share of the work of the local committee in connection with the annual meeting, and he thanked the many firms who had offered help and hospitality to the Society during the period of the meeting, in spite of the difficult industrial situation.

DR. WRIGHT, representing the executive of the South-Wales Section, invited the Society to hold its annual meeting next year in South-Wales, with Cardiff as headquarters. The South-Wales Section, though the baby of the Society's sections, would make up for its historical deficiencies by the warmth of its welcome.

DR. PICKARD, on behalf of the Society, accepted the invitation, and assured Dr. Wright that, baby though the South-Wales Section might be, there was no misapprehension as to its lustiness.

Professor Clemo presented to Dr. Dunn, on behalf of the Newcastle Section and other friends, a barometer in token of their appreciation of him.

DR. DUNN said the Newcastle Section had been part of his life, and he hoped it would be for many years to come.

Mrs. Dunn, on behalf of the Section, presented a bouquet to Mrs. Clemo.

Chemical Factory Fire

Large Quantities of Anthracene Involved

ONE of the most disastrous fires for a number of years in the East End of London broke out on Wednesday morning at the premises of Forbes, Abbot and Lennard, Ltd., chemical manufacturers, Autumn Street, Old Ford Road, Bow.

Shortly after the alarm was given the building became a blazing furnace, and in order to cope with it a brigade call was issued to the fire stations, and engines from all over London responded. Owing to the great billowing clouds of smoke the firemen had to use gas masks. The fire issued from a huge tank of highly inflammable anthracene, and the smoke clouds rose from a large storage of smoke-bomb mixture at the chemical factory. The flames soon spread to adjoining premises, and the large timber yard of T. J. Land and Sons soon became a mass of flames. A great stack of timber soon became a roaring furnace.

The entire chemical factory was gutted, and thousands of gallons of oil and hundreds of tons of saltpetre were destroyed, and together with T. J. Land's timber yard and other property involved by the fire, it is estimated that it caused £150,000 worth of damage. Other adjoining premises which were in great danger of becoming involved belonged to Bryant and May, Ltd., the match manufacturers; Carless, Capel and Leonard, petrol and naphtha refiners; John Kidd, linseed oil manufacturers; and Permanite, Ltd., bitumen manufacturers. For over six hours about 300 firemen were engaged in fighting the flames. The flames leaped the River Lea, and burned the fencing of the Thames Haven Oil Co., in spite of the firemen's efforts to prevent it.

Albert Starch, aged 38 years, was burned on the neck, and Fireman Herbert James William Stretten, age 25, London Fire Brigade, was cut on the right hand; both were removed to hospital. Fireman William Frederick Balson, 28, also of the London Fire Brigade, suffered injury to his eyes.

Here and There

MR. J. W. CRAGGS, hon. secretary of the Newcastle Section, with the co-operation of Dr. G. E. Stephenson, assistant secretary, compiled an excellent handbook as a souvenir of the meeting. Besides a detailed programme and a mass of useful local information, it contained an article on "The Early Chemical Industry of the Tyne," by Dr. J. T. Dunn, president-elect of the Society.

* * *

MEMBERS had a choice of eleven works visits on Thursday and Friday. The visit to the Imperial Chemical Industries fertiliser and synthetic products works at Billingham was the chief of these attractions, and a large number of intending participants were disappointed owing to the party being strictly limited to 100.

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PROFESSOR G. R. CLEMO, chairman of the Newcastle Section, was the host at the informal reception on Monday evening, which marked the opening of the week's programme. The reception gave the visitors an opportunity of meeting Mr. J. W. Craggs, hon. secretary, and the other members of the local section, who had been responsible for the general arrangements.

* * *

MR. A. T. KING, of the Wool Industries Research Association, who presented a paper at the Chemical Engineering Group session on Tuesday, was congratulated by Mr. J. Arthur Reavell, chairman, upon the fact that he had just been appointed Professor of Textiles at Leeds.

* * *

ON Tuesday evening the members of the Society and their friends attended a civic reception at the Laing Art Gallery, where they were received by the Lord Mayor (Councillor J. W. Leech, M.P.) and the acting Lady Mayoress (Mrs. G. Hall). The Lord Mayor, in a short speech, extended a cordial welcome to the Society, and Dr. R. H. Pickard suitably responded. Mr. J. W. Craggs, the local secretary, presented Mrs. Hall with a bouquet.

* * *

THE statement of accounts for the year ended December 31, 1932, showed a total expenditure of £22,271, against an income of £21,766, the excess of expenditure over income being £505, against a similar excess of £480 in the previous year. The Messel Fund, with a total income of £1,724, showed a balance of income over expenditure of £1,023. The Chemical Engineering Group had a total income of £797, and a balance of income over expenditure of £14.

* * *

A TELEGRAM in the following terms was sent to the King on Tuesday: "May it please your Majesty, the members of the Society of Chemical Industry assembled at Newcastle-upon-Tyne in annual meeting, desire to re-affirm their loyalty to their Royal Patron and humbly to express their hope for his continued good health." The following reply was received: "The King sincerely thanks the members of the Society of Chemical Industry assembled at Newcastle for their loyal message."

* * *

MOST of the members participated on Wednesday in an enjoyable motor coach excursion to the Roman Wall at Housesteads. They lunched at the George Hotel, Chollerford, by invitation of the Lord Mayor, from whom a telegram of good wishes was received during the luncheon. The party visited Hexham for tea on the return journey.

Scale Prevention in the Boiler

AN OMISSION was made in the letter from Aluminium (II) Ltd., which appeared in THE CHEMICAL AGE, July 8, page 34. The latter part of the last paragraph should have read: "Calcium nitrate, magnesium nitrate and chloride will not give any alkaline reaction to phenolphthalein and mehthyl orange *in natural waters, although it is true to say that if aqueous solutions of these salts are heated to very high temperature, hydrolysis may take place, producing bases and acids; the former give the alkaline reaction to phenolpthalein and methyl orange*, whilst the latter commence the well-known cycles of acidic corrosion.

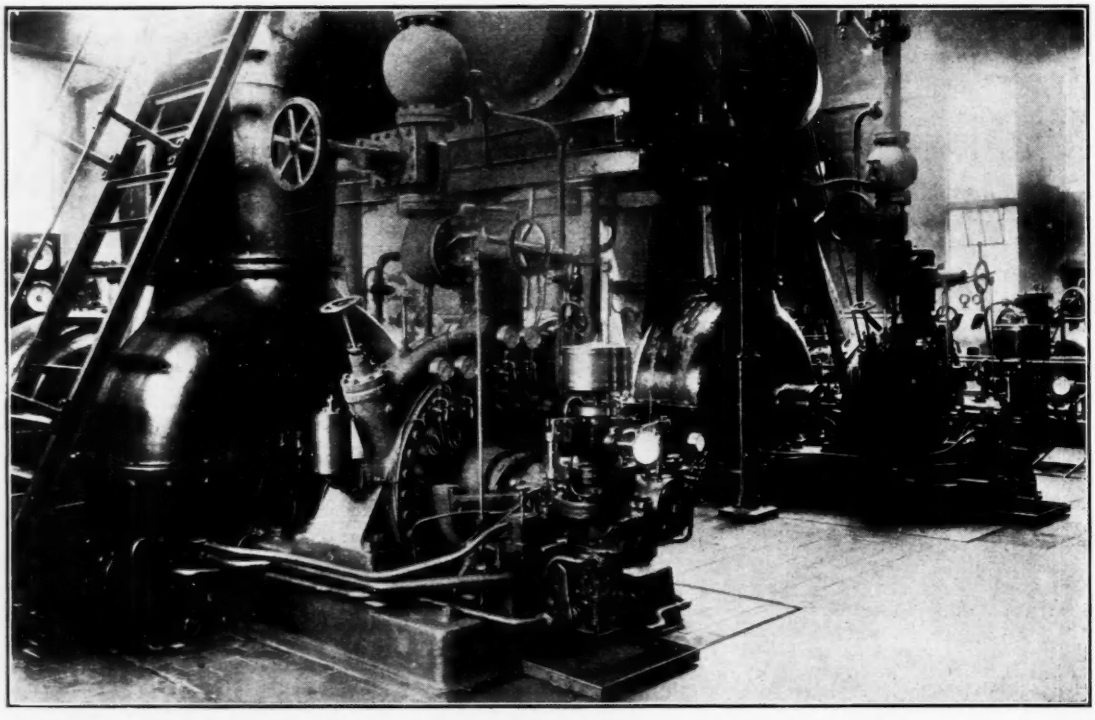
Works Visits in and around Newcastle

A Survey of North Eastern Industries

THE industrial activities of the North East of England, coupled with the enterprise of the Newcastle Section of the Society of Chemical Industry which was responsible for the compilation of the programme for the fifty-second annual meeting held at Newcastle this week, provided the large number of members who attended with unique opportunities for visits to a large number and variety of modern works. The following notes, compiled from information specially supplied to THE CHEMICAL AGE by the firms concerned, summarise the week's itinerary.

Derwenthaugh Coke Works

THESE works of the Consett Iron Co., Ltd., which have been in operation since February, 1929, are situated about three miles from Newcastle-on-Tyne, and about twelve from Consett. They are on land adjoining the company's private railway which connects their North Side Collieries and Shipping Staithes, and are also within convenient distance of the Redheugh Gasworks of the Newcastle and Gateshead Gas Co., to which approximately ten million cu. ft. of gas per day is supplied. The works were put down principally to make high class furnace coke, and high class coke and coke nuts for the domestic market, largely for the company's local and export trade, and also to make gas for the Newcastle and Gateshead Gas Co.



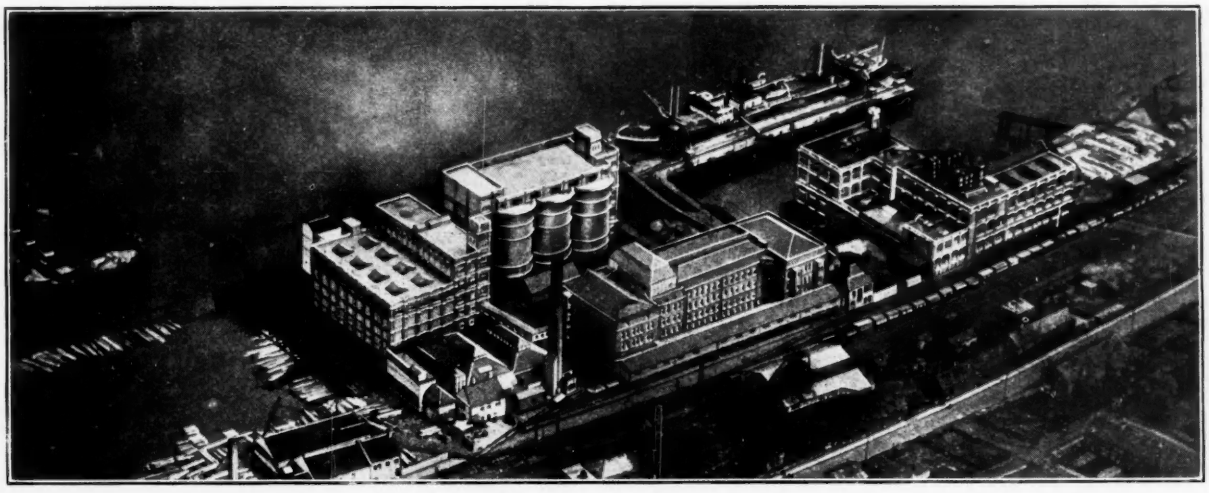
Turbo-Compressor Plant at the Derwenthaugh Coke Works of the Consett Iron Co., Ltd.

The coke ovens are of the "Otto" twin-flue regenerative type, the plant consisting of 66 ovens arranged in two groups of 28 and an additional group of 10 ovens. The ovens are 44 ft. 7 in. long, 14 ft. high, and have a mean width of 18 in., the capacity being about 17 tons of crushed coal per oven. These ovens are noted for their ease of control, their even heating, their low flue temperature for a given output, and for their thermal efficiency. Roughly 65/70 per cent. of the gas made is available for sale or use on the plant, only about 30/35 per cent. being used for heating the ovens. The oven walls are built of the silica material for which the Consett Iron Co. is famous. The whole of the coke oven machinery was supplied by the Wellman Smith Owen Engineering Corporation, Ltd.

The by-product plant is of the semi-direct type. The condensers recover tar and ammonia liquor from the gas, which are separated by decantation, the liquor being subsequently treated on the sulphate plant for the recovery of ammonia and its conversion into sulphate. The gases after leaving the exhauster enter the sulphate plant where the whole of the ammonia is removed from the gas. Leaving the sulphate plant the gas enters the final cooling plant wherein the gas is partially cooled, washed with oil to remove the naphthalene, and finally cooled with water before entering a series of three benzol scrubbers. After benzol extraction, the quantity of gas for heating the ovens is drawn off and the remainder passed through a Holmes' rotary washer for the removal of the last traces of naphthalene before being boosted to Newcastle.

The tar recovered is not further treated at the works excepting to reduce the water content below specification by means of decantation and settling in storage tanks, after which some of it is distributed to the company's central distillation plant, and the remainder to large storage installation at the Staithes, and various customers. The acid sulphate of ammonia as recovered from the saturator is centrifuged to remove excess of acid and water. It is then neutralised and dried in a specially constructed plant which minimises the breakage of crystals, thus keeping the sulphate in a granular condition. This product is made to conform to the specification of the British Sulphate of Ammonia Federation. The recovered naphthalene is centrifuged to remove surplus oil and water, and marketed without further treatment.

The benzol in the gas is absorbed by the circulation of gas oil in tower scrubbers, and afterwards the crude benzol is separated in a continuous crude benzol still. It is then rectified into motor benzol and solvent naphthas, the former



The Dunston Soap Works of the Wholesale Co-operative Society

complying with the specification of the National Benzol Association, and the latter made according to the requirements of customers. The supply of gas delivered to the Newcastle and Gateshead Gas Company is sold according to specification which stipulates that the gas shall have a calorific value of not less than 505 B.Th.U. (gross) per cu. ft., and shall not contain more than one grain of naphthalene per 100 cu. ft., or one grain of ammonia per 100 cu. ft., or 12 per cent. of inerts.

Dunston Soap Works

THE Dunston Soap Works of the Wholesale Co-operative Society is situated on the Durham side of the Tyne and was opened in 1909. As at that time only about an acre of land was available it necessitated erecting the main building on piles in the river bed. It is a good example of the "Hennibique" system of ferro-concrete construction. Besides being well situated for water transport by which means most of the raw material is delivered, the main railway siding bounds the works on the south side. A Ruth steam accumulator has now been erected on the flat roof of the building 60ft. above the river level and the operation of this plant has facilitated the use of steam in the works, a constant pressure of steam from the boilers being assured and one hour's normal consumption being held in reserve, which carries any peak load which may occur during the working day.

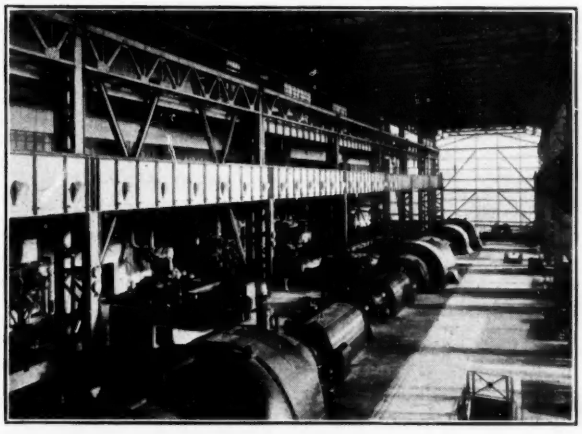
The melting-out tanks for the various oils and fats are situated in the basement close to the point where the material is delivered. After settling, the mixed material is pumped to the soap boiling room on the top floor where saponification is effected. In another department, the caustic alkalies are manufactured and prepared to the correct strengths for use. When the boiling operation is complete the hot soap base is allowed to flow to the mixing room and finally reaches the ground level where it is cooled. After conditioning, stamping out and cartonning is performed at this point, and the soap is then available for despatch by rail or road transport.

The manufacture of toilet soap is effected in another section of the building, and again the preparation of the soap for milling is performed at a higher level than the milling room, the various productions thus gravitating to the point of despatch. The toilet milling operations are thoroughly up-to-date. Soap powder manufacture is effected mainly by a patent spraying process, and various ingenious powder-packing and canister filling machines are in operation. Glycerine recovery from the waste lyes is also dealt with, necessitating the treatment and filtration of the glycerine liquor, and final concentration by the use of vacuum evaporating plants. All kinds of soaps are made including household, tablets and bars, toilet soaps in great variety and a number of toilet sundries, soap powders, polishing powders, soft soap and liquid soap. The factory is capable of turning out 250 tons of soap per week and employs nearly 200 workers, who work a 44-hour week.

Dunston Power Station

THE bringing of the Dunston Power Station into operation, in January, 1933, was of historic interest, in that it marked the first important step towards the supply of electrical energy throughout the North-Eastern Electric Supply Co.'s area, at the national standard frequency of 50 cycles per second. The company was the first electricity supply authority in the country to introduce electric power transmission and distribution on the three-phase alternating current system—the first supply being given in 1901.

The site on the south bank of the River Tyne about two miles west of Newcastle has an area of approximately 75 acres with a river frontage of about one quarter of a mile. The station is built on the western part of the northern portion of the site and the buildings are sufficient to accommodate four 50,000 kW sets. Provision has been allowed for extending in an easterly direction to accommodate two more 50,000 kW sets with the necessary boiler plant. The turbine house contains three 50,000 kW two-cylinder tandem turbo-alternators running at a speed of 1,500 revolutions per minute and generating electrical energy as three-phase current at a voltage of 13,500 and a frequency of 50 cycles per second. The steam pressure at the stop valve is 600 lb. per sq. in. at a temperature of 800°F. Reheating is adopted, the exhaust steam from the high pressure cylinder at a pressure of 115 lb. per sq. in. being taken back to the boilers and reheated to its initial temperature of 800°F. before returning to the low pressure cylinder. Steam is bled from the turbines in stages for feed water heating up to 340°F. and for evaporating the feed water make-up. Each alternator has a continuous maximum rating

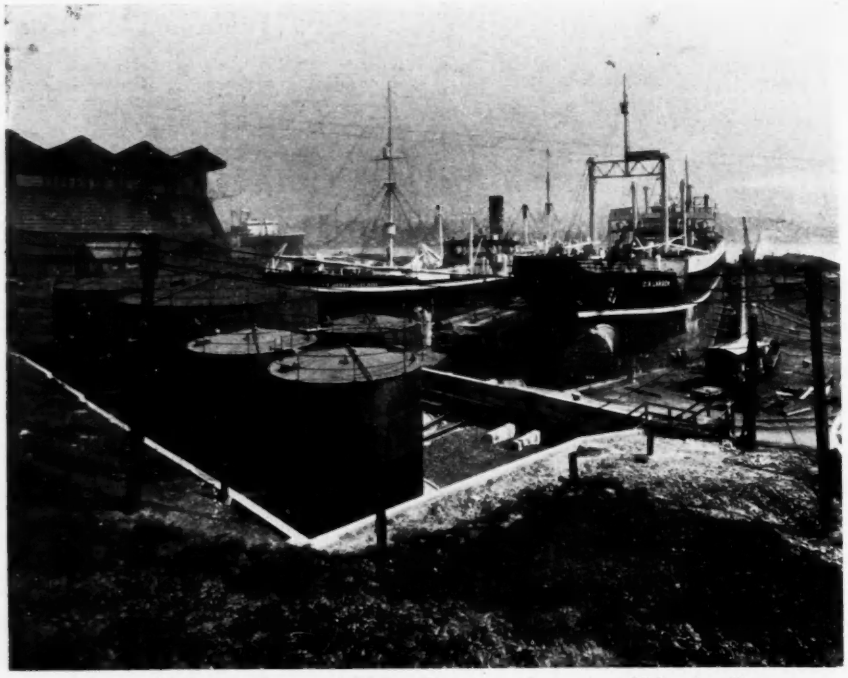


Interior of Turbine House at Dunston Power Station

of 50,000 kW at 0.8 lagging power factor and its exciter is direct driven from the main alternator shaft.

A non-condensing house turbo-alternator set of 2,500 kW capacity is installed for the supply to auxiliaries on starting up, but the normal supply to the auxiliaries is taken either from a unit transformer on each alternator or from the station main auxiliary transformers. There are two boiler houses, each arranged at right angles to the engine room. The west boiler house contains four steam generating units and four combined steam generating and reheating units. The steam generating units are each capable of evaporating 156,000 lb. of steam per hour at a pressure of 625 lb. per sq. in. superheated to 825°F. Each combined steam generating and reheating unit is capable of evaporating 125,000 lb. of water per hour and reheating 180,000 lb. of steam per hour from a temperature of about 520°F. to a temperature of 825°F. The east boiler house is arranged for pulverised fuel firing, only one line of boiler and reheater units at present being installed.

Current generated at 13,500 volts is transformed to 66,000 volts by means of step-up transformers directly connected to the alternator terminals and the main switching is done at this voltage. The switchgear is of the duplicate busbar metalclad oil-filled phase isolated type and is accommodated in two separate switch houses, each divided into two sections by fire isolating barriers. The circuit-breakers are remote electrically operated and are of the multi-break type having a rupturing capacity of 1,500,000 kV.A.



Storing Oil from the Bunkers of Whaling Factories, under repair at Wallsend-on-Tyne

Shipbuilding and Engineering

THE present company of Swan, Hunter, and Wigham Richardson, Ltd., Wallsend-on-Tyne, is an amalgamation effected thirty years ago of the following firms: (1) C. S. Swan and Hunter, Ltd., Wallsend Shipyard; (2) Wigham Richardson and Co., Ltd., of the Neptune Works, Low Walker, founded in 1860, shipbuilders and marine engineers; and (3) The Tyne Pontoons and Dry Docks Co., Ltd. The works are 78 acres in extent. There are sixteen shipbuilding berths, the largest of which can take vessels up to 1,000 ft. in length. The berths are served by overhead electric travelling cranes, and four of the largest are covered with glass roofed sheds.

Swan, Hunter, and Wigham Richardson have built more floating docks than anyone else in the world, as well as floating workshops, caissons and dock gates, in fact nearly every ship appliance that floats in the water. At the company's Neptune Engine Works, Walker, the machine shops and boiler shop are equipped with the most modern machinery. In them are built various kinds of reciprocating steam engines, geared turbines and marine oil engines of several types. Among the latter special mention should be made of the well known Neptune-Polar oil engine. There are two types of this suitable for large ships or fasting running units which are ideal for small ships. The Bauer-Wach system has also been developed at the Neptune Engine Works. In this system the exhaust steam from a reciprocating engine is passed through a low pressure turbine geared to the main shaft. This combination has been completely successful and under similar conditions gives a fuel economy of fully 20 per cent. over triple expansion engines or an increased power of 25 per cent. for the same consumption.

At the Dry Docks Department there are two graving docks 561 and 495 ft. respectively. A third graving dock 570 ft. long with an entrance width of 80 ft is now being built, the contractors being Sir Robert McAlpine and Sons. The workshops adjacent to the docks are replete with every facility for executing work economically and quickly. During the construction of the new graving dock some of the machine shops are being reorganised, which improves the lay-out of the repairs department. At the head of the graving docks is a group of large tanks for storing and filtering oil taken from ships under repair. These tanks have proved to be of great advantage to the shipowners.

Stourton Chemical Works

THE Stourton Chemical Works of the Yorkshire Tar Distillers, Ltd., cover an area of 10 acres. They have a frontage of 260 yards on the Aire and Calder canal facilitating the receipt and despatch of goods by water, and also has railway connections with both L.M.S. and L.N.E. Railways, with nearly a mile of internal railway lines, the various plants linking-up and thus enabling raw materials to be unloaded and products loaded expeditiously and economically. Over 300 tanks are installed for the storage of tar, oils and finished products; the largest tank has a capacity of over 1,000,000 gallons of tar. The tar distillation plant works on

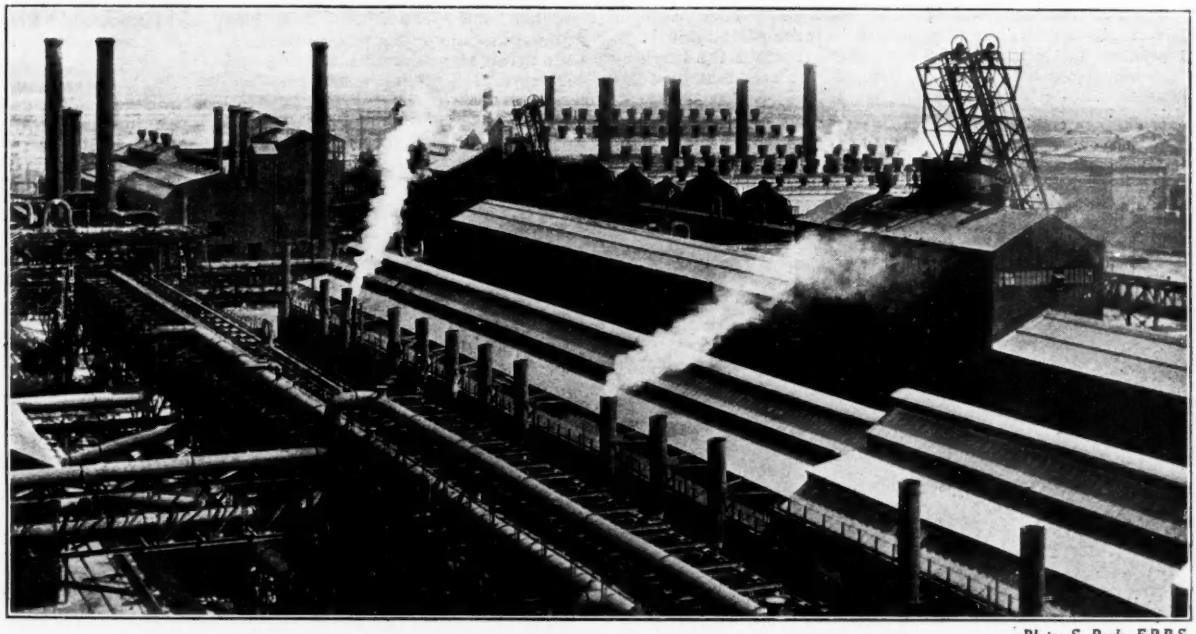


Photo: S. Boyle F.R.P.S.

The Billingham Factory of I.C.I. (Fertiliser and Synthetic Products), Ltd., showing Thompson Boiler Plant at top left corner

the semi-continuous system and produces crude tar oils and either pitch or road tar as required. Completely continuous units are installed for the distillation of oils and the extraction of crude phenols or crude tar acids. A large section of the works is occupied by the crystals carbolic plant. This plant, which has recently been extended and modernised, works up crude tar acids and produces pure phenol, cresols and xylenols, all of which substances are largely used in the plastic industry. Another interesting plant—which is the only one of its type in the country—is that utilised for the hydrogenation of tar products, producing such compounds as methyl-cyclo-hexanol, tetralin, piperidine, etc.

Heavy Oil Engines

THE portion of the Scotswood works now occupied by the Armstrong Saurer Commercial Vehicles, Ltd., was engaged after the war in the production of gas and oil engines, electric lighting sets and general engineering. This business was carried on until the beginning of 1931, when the whole of the plant was removed to another portion of the works to make room for new plant to be installed. The agreement to commence operations between the Armstrong Whitworth Company and the firm of Adolph Saurer, of Arbon, was signed in 1930, and the first vehicle left the Scotswood works in December, 1931.

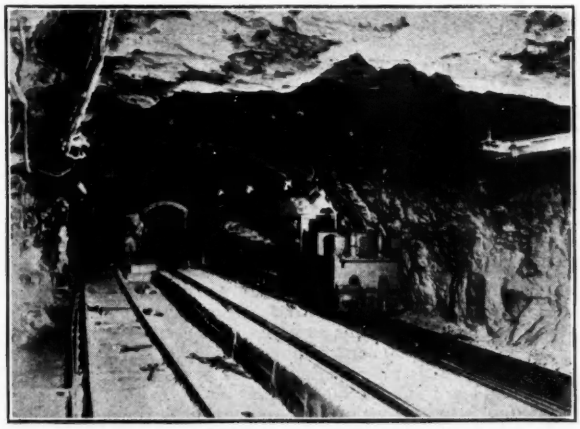
Two classes of work are conducted in the completely equipped laboratories at Scotswood, routine testing and special investigation. The former is confined to standard tests on all materials undergoing manufacture so as to maintain the high quality of the products; while the investigation work deals with any new problem that may occur, or in respect of any emergency that requires special and immediate attention. The material passing through the routine section includes iron, steel, bronze, and aluminium from the foundries, as well as steel stampings and other components that have been treated in the hardening department. Since the usual Brinell tests have been applied in the latter, it is only test pieces and selected samples of work that come under the jurisdiction of the laboratory.

Special investigation work is conducted with the aid of the routine equipment, but further examinations may be made in an experimental heat-treatment room or with the aid of microphotography, by means of which the photographs of samples are enlarged enormously to show the molecular structure of any material under test. The work of the laboratory also includes the analysis of fuel and lubricating oils, the testing of finished components.

The Billingham Factory of I.C.I.

THE industrial history of Billingham dates from 1917, when the possible shortage of shipping and the vulnerability of the ocean route from Chile caused the British Government to consider the development of ammonia synthesis as a source of nitrogen for explosives, along lines already fully elaborated in Germany. In that country the Haber-Bosch ammonia process had been put into operation before the war, and had received a great stimulus on its outbreak, ultimately becoming one of the principal sources from which explosives were obtained for the German forces. It was decided to build a factory at Billingham for the production of ammonium nitrate, but comparatively little progress had been made when the war came to an end in 1918. Work ceased immediately, but a Government Committee soon reported that the Billingham factory could be converted economically into a factory for the production of fertilisers. The main war product, ammonium nitrate, is itself a valuable fertiliser, so that there was a "beating of swords into ploughshares," and explosive factories served peaceful reconstruction purposes.

Private enterprise was invited to undertake this work, and in 1920 Brunner, Mond and Co. took over the assets and



Electric Loco in the I.C.I. Anhydrite Mine under the Billingham Factory

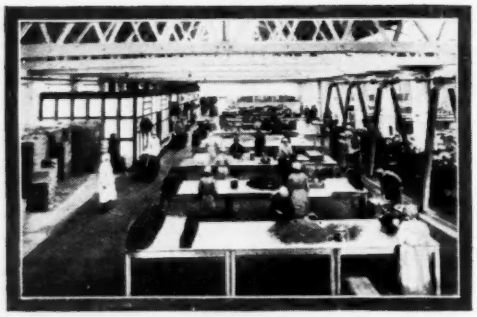
liabilities of the Billingham factory. These were found to consist of a site of 800 acres of approximately bare fields, a miscellaneous collection of plant, some incomplete knowledge of practice in Germany, and the plans on which the Government had decided to operate. Despite the fact that new designs and new research had to be put in hand, rapid progress was made, and a new company, Synthetic Ammonia and Nitrates, Ltd., since renamed I.C.I. (Fertiliser and Synthetic Products) Ltd., was formed. In 1923 the first plant at Billingham commenced production of synthetic ammonia. The process involves pressures of the order of 200 atmospheres, and the design and construction of the high-pressure plant are unique in this country.

Billingham's principal products for agricultural use include ammonium sulphate, nitrochalk, sodium nitrate, and various concentrated complete fertilisers. Nitrochalk takes the place of the imported Chile product, since it supplies "nitric" nitrogen combined with calcium, a vital need of the soil. Another synthetic fertiliser which is produced is one similar to that now being successfully used in Germany and marketed under the name of "Nitrophoska." It contains all three essential plant foods, nitrogen, phosphorus and potassium combined in suitable proportions. Among the many other chemical products of industrial use produced at Billingham are ammonia (both anhydrous and in solution), nitric acid, ammonium nitrate, sodium nitrite, ammonium bicarbonate, "Methanol" (methyl alcohol, produced from water-gas, and therefore indirectly from coke and coal), and solid CO_2 marketed under the name of "Drikold."

There is an almost inexhaustible supply of the mineral anhydrite (anhydrous $CaSO_4$) at a depth of 700 ft. elow the site of the Billingham factory, and this not only plays an all-important part in the manufacture of ammonium sulphate and "Billingham Carbonate," but is also used as a basic material for the manufacture of new building materials and cements. Over 90,000 tons of steelwork were used in erecting the Billingham factory, and to-day it extends over a square mile of land which some fifteen years ago was practically a wilderness. A consideralbe town has developed around the old village of Billingham, and with the 1,800 houses built by the company, the total area now occupied slightly exceeds that of the nearby town of Middlesbrough.

The World's Garden Toffery

THE works of A. S. Wilkin, Ltd., at Cremona Park, are known as "The World's Garden Toffery," and on their visit this week the members of the Society of Chemical Industry saw great cauldrons capable of turning out 20 tons, or 4,500,000 pieces of toffee in a working day. At one end of the factory are the raw materials and at the other are piles



Weighing and Packing Toffee at the Works of A. S. Wilkin, Ltd.

of packed cases of toffee ready for despatch. In the factory are enough bags of the best refined British sugar to last the housewife a lifetime and then have some over. Condensed milk is received in 5-cwt. barrels which are hoisted over a large trough to pour their contents in a creamy stream. In the raw materials department there are such delectable things as angelica, glace cherries, rice paper, nuts, and fruit.

In the glass-roofed factory, girls were rolling sheets of toffee out on water-cooled tables, cutting it into slabs and sorting thousands of pieces with great rapidity. Toffee bubbled in the cauldrons, while mechanical mixers rotated rapidly in the copper pans. Butter, sugar, milk and cream were being transformed into toffee, then poured out on to the cooling tables. The ingredients are put into the mixers and these "cook as well as mix." On the walls are pressure indicators, for toffee must be cooked to a certain temperature and standard. The boiled toffee is poured on to cooling tables and is then cut up into squares by machines which are capable of cutting up 8 to 10 tons of toffee in a day. Some of these machines stamp it out, others give it a clean cut. The

Toffee Wrapping Machines at the Works of A. S. Wilkin, Ltd.

nuts and fruit are rolled into the toffee on the tables. Machines wrap the toffees in their bright foils and waxed-paper. They can wrap anything from 180 to 380 pieces of toffee in a minute. In another department thousands of pieces of toffee were being covered with chocolate. A wide moving band encased and stretching the length of a room, conveyed them first into a cascade of chocolate, allowing them to emerge from the stream so that the girls might "fork mark" the pieces and then took them along the various stages until they came out of the other end of the case, a special kind of refrigerator, cooled and ready for packing. Tins of toffee are vacuumised for the export trades so that the contents keep for 20 years. On leaving the factory the visitors were impressed by the model gardens and surroundings that make this an ideal factory. The firm gains satisfaction in the cheerfulness and happiness of its workpeople and surroundings.

Modern Pottery Production

IN the district round about Newcastle and Sunderland 100 years ago there must have been at least 40 potteries where white earthenware, cane and brown ware were made. Some of these potteries were well known as they turned out some very good ware. Of all these potteries there is only one now running, namely that of C. T. Maling and Sons, Ltd. This firm was started in 1762 when a wealthy Sunderland gentleman bought part of the Hylton Castle estate and built a pottery there for two of his sons, Christopher Thompson (No. 1) and John Maling. In course of time the property was handed down by John Maling to his son, Robert Maling, who transferred the business to Newcastle in 1817. In 1859 his son, Christopher Thompson (No. 2) built the "A" Ford Pottery and earned world-wide reputation as being one of the first potters to make vessels of correct capacity like jam pots by machinery. So great was the demand for his pots that over 25,000,000 were made in a year. In 1879 C. T. Maling (No. 2) built a second pottery which at the time was the largest in England if not in the world. This is now carried on by his sons, Christopher Thompson (No. 3) and Fred T. Maling, assisted by Christopher Thompson Maling (No. 4). The "B" Pottery, built in 1877 is the works through which the visitors were shown this week.

Of late years the jam pot trade, due to the automatic glass bottle machinery, has given place to highly decorated ware. Instead of seeing millions of jam pots, the visitors saw the most delightful dinner, tea and coffee sets being produced; also vases, electric light standards, and all classes of general ware.

Ashington Collieries

THE Ashington, Linton, Woodhorn, Ellington and Lynemouth collieries are situated in the northern extremity of the Northumberland coalfield and cover the largest portion of the field to the north of the River Wansbeck, about five miles from Blyth. The royalty is large, covering an inland area of 25 square miles with a further 14 square miles extending eastwards under the North Sea. The annual output is in the neighbourhood of 3,000,000 tons of coal. The coal produced is steam coal and house coal, which is sold under the name of Bothal West Hartley Steam and Ashington Wallsend house, and bunker coal, and the smaller sizes are much used for producer gas.

North British Rayon Factory

BUILT in 1928 and started into production in the middle of 1929, the Jedburgh factory of the North British Rayon Co. enjoys the dual distinction of being the youngest in the industry and the only one operating north of the Border. The company manufactures rayon by the viscose process which is now stated to produce 80 per cent. of the world's rayon output. Unlike many of its competitors, which failed to survive the recent economic slump, this firm had from the outset the advantage, in addition to a trained staff, of a thoroughly up-to-date plant embodying all the improvements in rayon manufacture which have been a notable feature of the past few years.

The Centralised Washery and Air-Cleaning Plant at Ashington Colliery

Although the company has been operating for nearly 70 years, the lowest seams still await development. There are thus considerable reserves and an estimated life of 100 years at a daily output of 15,000 tons is conservative. The oldest pit at Ashington was sunk in 1862; other collieries operate at Linton, Ellington, and Woodhorn and new shafts have been sunk at Lynemouth largely to develop undersea coal. In recent years the company has followed an enterprising and extensive policy of mechanisation and general development; 92 per cent. of the coal is obtained by machine cutting, and nearly 50 per cent. of this is transported underground by conveyors. Surface plants have been remodelled and standardised, and with the provision of a centralised washery and air-cleaning plant, Ashington Colliery is one of the best equipped collieries in the world. A large and modern laboratory has also been erected for the systematic sampling and testing of fuels, and for the investigation of problems connected with them.

The company owns and operates 25 miles of private railway lines, linking up the different pits and connecting them to the London and North Eastern Railway, by which all products are despatched. As the collieries are only five miles from the shipping port of Blyth, they are well situated for both coastwise and export trade.

Cellulose sheets form the raw material, and these are first treated by immersion in caustic soda solution, the excess being pressed out and the swollen fibres disintegrated into a fine bulky "crumb" of alkali cellulose. This is converted by treatment with carbon bisulphide to a soluble xanthate, which in subsequent aqueous solution produces the viscose from which the process takes its name. This solution when acidified regenerates the cellulose which in the course of precipitation can be drawn into fibres, and these after suitable washing treatment form the basis of the finished rayon. A tour round the Jedburgh factory shows, however, that in practice the process is almost unrecognisable from such a simple description. In the first place, the cellulose sheets are cut to an exact size and conditioned to a uniform moisture content before being submitted to the caustic soda treatment. This uniformity of treatment is the keynote of the whole process; without it the quality and consistency of the product would suffer.

In addition to the departments concerned with the actual production of rayon, the visitor to the factory is shown extensive recovery apparatus for various chemicals, a modern water treatment plant, laboratories for control and research, and a number of other interesting sub-departments.

The Imperial Institute, London

The General Value of its Work to Industry

THE Imperial Institute was founded as the Empire Memorial of the Jubilee of Queen Victoria. Its principal object is to promote the development of the commercial and industrial resources of the Empire. The technical work of the Institute is carried out by a Plant and Animal Products Department and a Mineral Resources Department, each with an advisory council with which are associated advisory technical committees consisting of authorities on the various groups of raw materials. Close touch is also maintained with producers, users, merchants and brokers. Valuable help can thus be given to persons interested in the development of the resources of raw materials throughout the Empire. The departments mentioned comprise intelligence and investigations sections. A further important division of the Institute comprises the public exhibition galleries which serve as a permanent exhibition of the natural resources, scenery and life of the people of the Dominions, India and the Colonies.

The investigations sections of the Institute are concerned with the technical and chemical examination of raw materials from Empire sources, with the object of ascertaining their suitability for industrial use and commercial development. Results of some of these investigations are published in the quarterly "Bulletin of the Imperial Institute," and are frequently quoted in THE CHEMICAL AGE. The inquiries dealt with are chiefly for technical and commercial information regarding the production, utilisation and marketing of raw materials; the intelligence sections at the Institute are therefore information bureaux which should be better known and more widely used by manufacturers and commercial firms in this country. An extensive library of technical books and periodicals is maintained for the use of inquirers and, as Dr. E. H. Tripp pointed out in a paper read before a conference of the Association of Special Libraries and Information Bureaux a year or two ago, this library is exceptional among London libraries in that scientifically qualified assistants are available to help inquirers in their search for information.

Scope of Inquiries

In recent years upwards of 1,500 inquiries have been dealt with annually, emanating from official departments at home and overseas, planters, mining companies, manufacturers, merchants and others. The products of practically every country of the Empire are concerned and the field covered is remarkable for its variety and interest. An essential part of the work is the indexing of information likely to be of service in connection with the inquiries and with the activities of the Institute as a whole. The facilities available are at the disposal of applicants free of charge, and firms and others needing information are invited to take advantage of them. A few examples will illustrate the general nature of the work. Machinery manufacturers frequently receive requests for plant required for the preparation for the market of products, such as oil seeds, fibres, nuts, etc., which are unfamiliar to them and also request information regarding the product before their problem can be usefully considered. The converse inquiry, in which overseas correspondents desire to be put in touch with machinery manufacturers, is often received. Other inquiries include requests for technical particulars of industrial processes and of the plant required; these naturally involve reference to firms able to suggest suitable equipment. During the past two years a significant feature of the work has been the inquiries received for information regarding commodities affected by the new tariff legislation, the object being to ascertain Empire sources of materials not liable to the duties.

In recent years there has been an increasing public demand for fruit juices which are now marketed in excellent condition. Orange juice, in particular, has been the subject of many inquiries, whilst among lesser-known products of this kind in which interest has been taken are passion-fruit juice from Australia and New Zealand and pomegranate juice from Mediterranean countries. Papain is another frequent subject of inquiry and samples from several colonies have been well reported on after examination in the Institute laboratories and submission to trade experts. There is, however, a risk of over-production of this useful commodity and prospective producers have been advised accordingly. The virtual monopoly which Russia holds in Artemisia seed, the source of santonin, makes it very desirable that supplies from Empire countries should become available. With the kind co-operation of a well-known firm of manufacturing chemists supplies of the seed have been sent to one or two countries for trial cultivation and information has been furnished to a number of inquirers as to the method of growing the plant and preparation of the drug.

Insecticides from Empire Sources

Considerable attention is being paid by manufacturers to the preparation of improved insecticides particularly for agricultural and horticultural purposes. Many inquiries have been dealt with in this connection. For example, firms have been put in touch with sources of supplies of Derris root in Malaya where the root is a well-known fish poison. The active principle of Derris is rotenone and manufacturing chemists have been supplied with particulars regarding this substance. Pyrethrum is a further example. Hitherto pyrethrum flowers have been obtained from Japan and Dalmatia, and Empire sources of production have been desirable. Information as to cultivation, preparation and marketing has been supplied to planters overseas, especially in Kenya Colony where there is already a promising commercial production of the flowers. Samples have been examined in the Institute laboratories and reports furnished. Much interest has also been aroused in Cube root from South America, and information on this product has been supplied.

In recent years Indian lac has met with increasing competition from artificial resins in a number of industries. At the request of the High Commissioner for India in London the Advisory Committee on Essential Oils and Resins appointed a sub-committee to advise as to measures to meet this competition and a scheme of applied research on lac was strongly recommended, supported by a proposal that the necessary funds should be raised by increasing the cess levied on lac exported from India. Such an increase has been approved and a scheme of work has been put into operation.

In these days of trade depression and low prices of staple commodities, producers more than ever are seeking additional sources of revenue from what were previously waste materials. Inquiries dealt with in this category include the utilisation of sisal waste, rice hulls, ground nut husks, sugar-cane megass, waste wood, the residues from essential oil distillation and tannin extraction, etc. Such inquiries, of course, involve the consideration of various manufacturing processes, such as destructive distillation, alcohol production, paper-making, furfural manufacture, linoleum manufacture and so on, according to the nature of the material concerned. Many of these products have been investigated in the Imperial Institute laboratories.

Inquiries Concerning Mineral Resources

A considerable amount of work has also been done in recent years with a view to determining the suitability of clays, limestones and other deposits in the colonies for the production of bricks, tiles, porcelain goods, earthenware, portland and other hydraulic cements, etc. This work is carried out in the laboratories of the Institute which are specially designed for conducting small-scale technical trials on such materials. Of other inquiries on mineral resources the following may be instanced. A Canadian inquirer who was looking into the question of exporting gypsum to the United Kingdom to take the place of that now imported from abroad, was given information as to the trades using the mineral and an estimate of the consumption of certain trades. Firms requiring supplies of high-grade magnesite were put into touch with Empire producers able to furnish the desired product. A British firm about to erect an electric cable in India were given information as to where alkaline soil was likely to be

encountered on the route and given suggestions as to means whereby the deleterious effect of the saline matter might be overcome. Manufacturers of a cement claimed to be very resistant to the action of saline matter were given information regarding localities in the Empire where their product was most likely to be of service, and suggestions as to what overseas authorities to approach on the matter. A number of inquiries have also been received from overseas regarding the use of charcoal as a source of producer gas for driving motor lorries. Charcoals from several of the Colonies have been examined with reference to the question, and inquirers have been put into touch with United Kingdom makers of plant suitable for attachment to lorry engines.

During the past year, two interesting cases occurred where the Institute laboratories were able to assist British manufacturers in cases of unusual difficulty. In one case a London manufacturer of photographic materials reported that packages of dry plates exported to Japan were found, on arrival, to contain only dried clay. An examination of the latter material showed that the mud was probably of Pacific origin, and the presence of rice husks in the mud afforded further evidence that the substitution had not taken place in this country, but in the Far East. In the second case a consignment of wattle bark from East Africa was found to contain rock fragments, and it was desired to know where these had been introduced. Here, examination showed that the fragments were typical of the East African volcanic rocks occurring at or near the place where the wattle had been grown.

Occasionally, as the result of industrial research, a demand arises for a mineral product for which there had been previously but little production. In this case the Imperial Institute is often able to assist by indicating possible sources of supply. For example, inquiries were recently received relating to sources of tellurium and selenium, kyanite, yttria minerals, and ilmenite. The following list of other subjects, taken at random from those dealt with in the last year or so, will further serve to show how the Imperial Institute can assist those engaged in the chemical and allied industries: Psyllium seed, nicotine sprays, improvement of East African beeswax, essential oils and fatty oils of all kinds, chicle gum, pectin, gelatine, algin, annatto, the pericarp oil of cashew nuts, saponins, lanolin, starches of various kinds, rice gluten, barytes deposits in the United Kingdom, supplies of tin slag, characteristics of certain foreign coals with special reference to their use in British-made producer gas plant, South African fluorspar, market for Australian arsenic, manufacture of potash and iodine from seaweed, and Empire sources of vandyke brown. Apart from the answering of specific inquiries, both written and verbal, much information is disseminated, by the Institute through its various publications. The quarterly bulletin points not only the results of some of the more important investigations, but articles and notes on raw materials, notices of recent books and gives a valuable bibliography of literature relating to plant and animal products. Special publications are also issued from time to time. On the mineral side over 60 brochures have now been published, each dealing with a separate metal or mineral product; these are revised periodically. There is also a series of Mining Laws of the Empire, of which 18 volumes have now been published. In addition provision is made for the statistical aspect by the publication of an annual statistical summary of mineral production and trade, which is world-wide in its outlook.

Empire Minerals for the Chemical Industry

A Survey of the Available Supplies

THE following notes, supplied by the Mineral Resources Department of the Imperial Institute, give a brief indication of the Empire's production and resources of those minerals which are of particular interest to chemical industry.

ALTHOUGH no particular part of the British Empire can claim to be well placed as regards its independence in the matter of mineral supplies, it is worthy of note that the supplies available in the different parts of the Empire are so complementary to one another that the Empire as a whole is distinctly well placed in this respect, and compares favourably as regards independence with other parts of the world. From this point of view minerals may be divided into four groups:—

(1.) Minerals which the rest of the world imports largely from the Empire, namely, asbestos, china clay, chromite, diamonds, gold, mica, nickel and tin.

(2.) Minerals of which the Empire has ample supplies, and an exportable surplus, namely, arsenic, cadmium, cobalt, coal, fluorspar, fuller's earth, graphite, gypsum, lead, manganese, monazite, platinum, salt, silver, strontium and zinc.

(3.) Minerals for supplies of which the Empire depends in some measure on foreign countries, but of which it has considerable resources, namely, bauxite, barium minerals, bismuth, copper, felspar, iron ore, magnesite, molybdenum, phosphates, talc, tungsten, vanadium and radium.

(4.) Minerals for supplies of which the Empire almost entirely depends on foreign countries, and of which its resources are comparatively small or negligible, namely, antimony, borates, petroleum, potash, pyrites, quicksilver and sulphur.

The position thus disclosed as regards degree of independence in the matter of mineral supplies is such that the Empire need not fear comparison with the rest of the world.

Empire Lead and Zinc

The Empire is responsible, at the present time, for some 26 per cent. of the world's production of lead, and with the development of large ore reserves at several mines, such as Mount Isa (Queensland), Lake George (New South Wales), and Buchans (Newfoundland), the Empire may be said to be in quite a strong position. The famous Broken Hill lode in New South Wales is still the largest Empire producer with a combined output in 1931 of ore equivalent to nearly 130,000 tons of metallic lead. It is closely followed by the smelters at Trail, British Columbia, Canada, to which the chief contributor is the Sullivan mine at Kimberley. India owes her position as the seventh leading producer of lead to the Bawdwin mine in the Northern Shan States of Burma. Lead maintains its position as the most important base metal from the point of view of chemical industry on account of the widespread use of its compounds in paints and storage batteries, and of the metal in the construction of chemical plant. Much interest has been aroused by the recent discovery that the addition of small quantities of tellurium to lead modifies the latter's physical properties and, amongst other things, increases considerably its resistance to corrosion by sulphuric acid. The new ternary alloys discovered by the British Non-Ferrous Metals Research Association have been approved for cable sheaths and for water pipes. Electrolytic processes are now being used for the production of both red and white lead and litharge.

With regard to zinc, the Empire's proportion of world production is about 20 per cent. The sources of supply are almost the same as for lead, since ores of both metals commonly occur in the same deposits. British Columbia and New South Wales (Broken Hill) are the chief producers of zinc as they are of lead. The Burma Corporation at their Bawdwin mine produces zinc concentrates which are shipped to Belgium for treatment. The Broken Hill mines of Northern Rhodesia have recommenced the production of electrolytic zinc, the estimated output for 1933 being 18,500 tons. The importance of zinc to the chemical industry lies mainly in the uses of lithopone and zinc oxide. Lithopone is becoming of increasing importance in the manufacture of linoleum, oil cloth, paints, enamels and rubber. Zinc oxide is important in the manufacture of artificial silks, rayons and textiles generally, rubber goods, printing inks, glass and glazes, matches, metal polishes, paints and enamels, and in pharmacy and dentistry. Zinc dust is used in the manufacture of dyestuffs, fireworks, paint and lithopone, and in the precipitation of gold from cyanide solutions and in sheradising.

In connection with the consumption of silver, the chemist is chiefly interested in its use in the photographic industry, in which large quantities are now absorbed. In the United

States, this industry is the second largest individual consumer, accounting in 1931 for 6,605,623 fine ounces, or about 27 per cent. of the total annual consumption of that country. Ample resources of silver exist in the Empire, principally associated with ores of other metals, from which the silver is recovered as a by-product. The Cobalt district in Ontario is a noteworthy example of a mining field worked primarily for silver, which is there associated with cobalt. Silver is associated with radium ore (pitchblende) in the interesting deposits now being opened up on Great Bear Lake in the far north of Canada. The great bulk of the Empire's production of silver is, however, obtained from gold, silver-lead, silver-lead-zinc, silver-zinc and silver-copper ores. Consequently, the leading producers are the countries which extract large quantities of gold, or of lead, zinc or copper ore. Canada produces all these, whilst Australia, India and South-West Africa produce silver from gold and from lead-zinc ores. South African silver production comes mainly from the Witwatersrand gold ores.

The world's annual production of bismuth probably amounts to about 400 tons of the metal. Although considerable quantities of bismuth ores are stated to occur within the Empire, the production is quite small, but important developments have taken place in Canada during recent years with reference to the extraction of metallic bismuth from electrolytic slimes. Late in 1928 the Consolidated Mining and Smelting Co. commenced the recovery of this metal from anode sludges obtained in the refining of lead at their Trail smelter in British Columbia. A production of 166,883 lb. of metallic bismuth was recorded for 1929, but the production declined to 16,855 lb. during 1932. A small quantity of bismuth is also produced in Canada from the silver ores of Northern Ontario in the form of silver-lead-bismuth bullion which is shipped to the United States for refining. In the United Kingdom relatively large quantities of bismuth are obtained from the smelting of Bolivian tin ores. Bismuth is used chiefly for the manufacture of fusible alloys and for medicinal, surgical and toilet purposes.

Nickel and Platinum Metals

Nickel is an outstanding example of a raw material which is almost entirely Empire-controlled, 90 per cent. of the world's output in normal times being produced from ores of the Sudbury district, Ontario, chiefly by the International Nickel Company of Canada, Ltd. The only Empire source of nickel outside Canada is India, which in 1931 produced some 800 tons of metal in the form of speiss as a by-product in the smelting of other ores. Before, and during the European war nickel found its chief use in the manufacture of nickel-steel for armaments, but, since then, research has immensely widened the field both for pure nickel and for nickel in ferrous and non-ferrous alloys. In the chemical industry malleable nickel is used in chemical plant and for laboratory equipment. Pure nickel is also employed as a catalyst in the hydrogenation of edible oils, in the manufacture of nickel oxide and nickel salts, as nickel anodes and salts for nickel plating, and the nickel elements in storage batteries. Nickel-copper alloys have manifold uses in the chemical industry, and nickel-chrome alloys are extensively used in the electrical industry.

The occurrence of nickel in nature is closely allied to that of the platinum group metals, platinum, palladium, iridium, osmium, rhodium and ruthenium. One of the two chief primary sources of these metals is in nickel-copper sulphide deposits. The Sudbury district of Ontario referred to above had for many years produced comparatively small quantities of the platinum metals, but the successful development of the Frood and Frood Extension mines of late years has added enormously to Canada's resources, as the ores of these mines carry relatively high value in these metals. The Acton refinery of the International Nickel Company, which was erected for the purpose of recovering platinum and other precious metals from Canadian and other ores, now has an annual capacity of 300,000 ounces of platinum group metals. The Empire has also the immense resources of platinum in the Bushveld Igneous Complex of the Transvaal, South Africa. The platinum-bearing rocks have been traced over very considerable areas in the Rustenburg, Lydenburg, Pietersburg and Potgietersrust districts. The development of South Africa's platinum deposits unfortunately coincided with a period of falling prices and consequently production has never reached the maximum possible at any of the mines. Nevertheless, the Union in 1930 produced ore containing over 55,000 troy oz. of platinum metals, thus taking third place amongst the world's producers. An interesting discovery was made in 1926 in Sierra Leone, from which a small production has been made since 1929.

Chromium and Manganese

For some years past the British Empire has maintained its position as the world's chief producer of chromite. Possessing large reserves of this ore in Southern Rhodesia, Union of South Africa and India, it was responsible in 1930 for nearly one-half of the world's output, Southern Rhodesia contributing more than one-third to this total. During the last three years, however, there has been a considerable decrease in Empire production due primarily to world depression and the exploitation of foreign deposits more favourably situated with regard to transport. Of the Rhodesian occurrences those of Selukwe and Lomagundi are perhaps best known. The chromite, which is of excellent quality containing from 48 to 54 per cent. chromic oxide, is shipped from Beira some 500 miles from the main sources of supply. In India, high-grade chromate containing on an average 55 per cent. chromic oxide occurs in Baluchistan, and is exported from Karachi. The Mysore deposits yield an ore, containing 40 to 48 per cent. chromic oxide, which is exported chiefly through the Portuguese port of Mormugao. The Transvaal chromite reserves are stated to amount to hundreds of millions of tons, and, although averaging 41 to 44 per cent. chromic oxide, enjoy better shipping facilities than those of Southern Rhodesia. In consequence the ore can be marketed at a lower unit price. Promising deposits of chromite have lately been discovered in the Kambui Hills of Sierra Leone. It has been estimated that of the world's annual production of chromite 46 per cent. is used in metallurgy, 41 per cent. in refractories, and 13 per cent. in chemicals. Chromium stainless steels are strongly resistant to acid corrosion and are used extensively for chemical apparatus. Chromium bricks are used for lining metallurgical furnaces, while the chromates of potassium and sodium are used for tanning, dyeing and pigments.

The Empire produces about 40 per cent. of the world's output of manganese ore, which normally averages about three and a half million tons per annum. Empire supplies come from the Central Provinces of India, the Gold Coast and the Postmasburg district in the Union of South Africa. It would appear that only about 5 per cent. of the world's output of the ore is used for purposes other than those of a purely metallurgical character and hence the amount used by chemical industry is relatively small, being chiefly confined to pyrolusite varieties containing a large proportion of "available" oxygen. Potential Empire supplies exist in Australia, Canada, New Zealand, New Guinea and Palestine.

Empire Vanadium

Formerly, the main source of the world's supply of vanadium ore was Peru, but in recent years Northern Rhodesia and South-West Africa have produced more than sufficient to satisfy the needs of Europe in normal times, and the output from South America has declined considerably. The Rhodesia Broken Hill Development Co., Ltd., in Northern Rhodesia produces monthly about 30 tons of fused vanadium oxide, carrying 90 to 95 per cent. of V_2O_5, and 100 tons of concentrates containing 17 per cent. of V_2O_5, the material being exported mainly to England. The Abenab and Tsumeb mines in South-West Africa have exported approximately 350 tons of concentrates (probably carrying about 9 per cent. of V_2O_5) per month to be treated mostly in Germany. Vanadium minerals have also been produced in the Transvaal and South Australia, while recent discoveries within the Empire include a vanadiferous iron ore in Southern Quebec and vanadium in the lead and copper lodes on the eastern border of the Pilbarra goldfield, Western Australia. At least 95 per cent. of the world's output of vanadium is consumed in metallurgical works, but the remaining 5 per cent. has a variety of important uses. It has been estimated, for example, that nearly 7 tons of vanadium are required annually for catalysts in the manufacture of sulphuric acid and various organic compounds.

For many years the Empire has been the most important producer of china-clay in the world. Large deposits occur in the United Kingdom, Union of South Africa, India, Malay States and Australia, those of the United Kingdom being world-famous and pre-eminent for their quality. Of the average annual production of about 800,000 tons obtained in the United Kingdom, it has been estimated that 450,000 tons are used in the paper industry, 250,000 tons in pottery, 50,000 tons in textiles, and the remaining 50,000 tons in other industries. The capacity of production, however, is considerably greater than 800,000 tons, being probably about 1½ million tons per annum, while the reserves are stated to be sufficient to last for at least a century at the normal rate of output.

Considerable resources of barytes (barium sulphate) exist in various Empire countries. There is, however, little inter-Imperial trade in this mineral, as the price realised does not permit of long-distance transportation costs. United Kingdom production approaches 50,000 tons per annum, and could doubtless be increased. India and Australia are the chief Empire producers. Barytes is used for the manufacture of the barium compounds used in the dyeing industry, in the manufacture of lithopone, barium peroxide, rat poison (barium carbonate) and fireworks (barium nitrate). It is used directly, in the finely ground state, as a filler, chiefly in paints, but also in rubber, linoleum and asbestos goods. Witherite is a much rarer mineral than barytes, England being the only important producer in the world. It is used principally in the manufacture of barium compounds, and, in its superior qualities, in the glass industry.

Extensive deposits of bauxite occur in several parts of the British Empire, especially in British Guiana, the Gold Coast, Northern Ireland, India and Australia. In 1931 the Empire produced 161,000 tons (equivalent to 15 per cent. of the world's output), of which 156,000 tons were obtained from British Guiana. The most valuable occurrences in British Guiana lie along the banks of the Demerara River from Wismar and Christianburg to Akyma and Komaru, some 10 to 14 miles apart. The material is of high grade and particularly suitable for the production of aluminium, for which purpose it is used in the United States and Canada. Irish bauxite, on the other hand, being of a siliceous nature, is not suitable for aluminium manufacture, but finds its chief application in the manufacture of aluminium sulphate, for which purpose its low content of ferric oxide is an advantage. Bauxite has been used for many years past in the refining of petroleum distillates. Experimental work has recently indicated that the ignited mineral is an efficient agent for the defection and decolorisation of sugar-cane juice. For chemical use the mineral is invariably purified or converted into one or other of the various aluminium salts employed in dyeing, printing, tanning, water purification, and the treatment of sewage.

The Rare Earth Minerals

The Empire possesses large supplies, both developed and undeveloped, of the minerals monazite (a phosphate of the cerium earths), ilmenite (titanate of iron), and zircon (zirconium silicate). These three minerals, which very often occur together in the form of sands, are all used in chemical industry. The sands containing these minerals are readily concentrated and separated by electro-magnetic means, for ilmenite is strongly magnetic, monazite weakly magnetic, while zircon is practically non-magnetic. Monazite was originally the only product marketed, being the principal source of thorium nitrate for gas-mantles, whilst the ilmenite and zircon were cast aside. The development of the non-poisonous titanium-white pigment, however, and the decline in the use of gas for illuminating purposes has reversed the order of importance of these minerals and ilmenite is now the principal product. Curiously too, monazite is no longer sold on the basis of its thorium content but chiefly on account of the cerium and other rare-earth elements which it contains, as the oxides of some of these enter into the composition of the heat-radiating units of gas fires. It is also the main source of supply of mesothorium. Zircon was for many years a drug on the market, and even now very little is consumed in this country, but there is now a fair market for it in the U.S.A. and Germany, where zirconium oxide is employed as an opacifier in enamels as well as for refractory purposes. Probably the demand will spread to this country when certain trade prejudices have been overcome.

India is the main source of supply of these three minerals, the very extensive beach sands of Travancore yielding more than 36,000 tons of ilmenite and about 850 tons of zircon in 1931. Ilmenite sands are also worked, to a small extent, in Tasmania, and supply the needs of a small titanium-white industry in Australia. In Sierra Leone ilmenite is obtained in the recovery of platinum. Ilmenite is an ubiquitous mineral, and there are large unworked Empire deposits of the sand in Ceylon and the Federated Malay States.

Phosphate Fertilisers

The British Isles consumes from 600,000 to 700,000 tons of superphosphate annually, of which only about 20 per cent. is imported, the remainder being manufactured in the country from imported phosphate rock. Although there are in the Empire large deposits of raw calcium phosphate, they are as a rule too remote for the home market so that our supplies come principally from North African countries. The extensive deposits of phosphate rock on Ocean Island and Nauru supply the large Empire markets in Australia and New Zealand. The rock is of high grade and some 100 million tons are said to be available, of which one-third is on Ocean Island. In a normal year the production exceeds half a million tons. Christmas Island is also an important producer with a normal annual output of over 100,000 tons, all of which goes to Japan. Seychelles, South Africa, Canada and Australia all produce small amounts, and a promising deposit in the mandated territory of Transjordania has recently received attention, but the Empire is far from being self-supporting as regards supplies of phosphate minerals. An interesting recent development is the manufacture of phosphoric acid and various fertilisers at the Consolidated Mining and Smelting Co.'s smelter at Trail, British Columbia. Large quantities of sulphuric acid are obtained there as a by-product in the smelting of sulphide ores of lead, zinc, etc., but the raw phosphate is obtained largely from the United States.

Sources of Radium

For many years the Belgian Congo has held a virtual monopoly of the supply of radium, on account of the rich deposit of pitchblende and allied minerals found in the copper belt of Katanga. Recently, however, a pitchblende deposit which is reputed to have considerable possibilities has been located and opened up in the Northwest Territories of Canada at Great Bear Lake. In opening up the veins which occur in a district very difficult of access, much use has been made of aeroplanes for transport purposes; during the season a daily service being maintained with the railhead at Waterways, Alberta, 850 miles distant. The Canadian Department of Mines has assisted in evolving a process for the recovery of radium from the ore, which is unusually free from thorium, and a refining plant has been erected at Port Hope, Ontario. During the summer months of last year, about 35 tons of dressed ore was produced and brought to the refinery; this is now being worked up, and it is hoped to produce some 5 or 6 grams of radium during the present year. Probably the whole of the product will be employed in Canadian hospitals and medical schools. Efforts are now being made to produce radium from the ore occurring at Mount Painter, South Australia. Other deposits of radium minerals in the Empire occur in India, South Africa and in Ontario, Canada, but none has so far proved to be capable of producing commercial supplies.

Iodine, Potash and Bromine

Although most of the world's iodine is obtained as a by-product from the recovery of sodium nitrate in Chile, an increasing quantity has been obtained in the United Kingdom, during recent years, from seaweed along the coasts of Ireland and Scotland. The Scottish kelp industry is over 200 years old, and at one period attained considerable size, but the present output is quite small. Usually the weed is dried and burned in kilns, the yield of iodine varying from 10 to 28 pounds per ton of ash. The resulting ash (kelp) is leached with water and the iodine separated by chemical treatment. In Northern Ireland considerable quantities of weed are collected on the coast of Rathlin Island and the east coast of County Antrim and County Down. The material is normally dried and burnt near the point of collection while the

kelp is marketed in County Antrim. In the Irish Free State, large quantities of weed are gathered on the west coast from Donegal to Kerry. The material is burnt on raised kilns built to Government specifications and the ash is chiefly exported to Scotland and France for treatment. Recently, however, an iodine factory was established in Galway. The value of the kelp produced in the Free State during 1932 was stated to be £30,000, the ash realising an average price of £7 17s. 4d. per ton.

One of the most interesting developments in Empire mineral production is proceeding in Palestine, where Palestine Potash, Ltd., is producing potassium salts and bromine from Dead Sea waters. Previous to the Palestine venture, the Empire depended almost entirely on foreign countries for its potash supplies, the only production being a small output of potassium nitrate obtained from the soil of old village sites in India. Although the Dead Sea output steadily increased during 1932, with an estimated total of 3,000-4,000 tons of contained K_2O, it is generally believed that the company has restricted its activities in view of world conditions. Mechanical equipment for the separation of carnallite was put into operation in early 1931. The water is now pumped from a depth of 175 feet where, it is said, the potassium and bromine compounds reach their maximum concentration. It is claimed that working at its maximum capacity, the plant could yield annually 70,000 tons of material containing 80 per cent. potassium chloride and 45,000 tons of 45 per cent. material. It is stated that the present capacity of the plant for producing bromine is about two tons per day. The possibility of obtaining potash and aluminium salts from the mineral leucite, has received attention, but in spite of the occurrence of large deposits in the Empire, such as those in Uganda, it seems unlikely that this source of potash will be exploited in the Empire in the near future.

Earthy Minerals

Large deposits of magnesite occur in the Empire. The Chalk Hills in Madras, India, supply a magnesite of the Grecian type. Extensive deposits of crystalline magnesite occur in Canada in Argenteuil Co., Quebec, and of hydro-magnesite near Atlin in British Columbia. Australia and South Africa also produce good-quality magnesite, but are not exporters. Other Empire resources are the recently discovered deposits at Smithton, Tasmania; Cranbrook, British Columbia, and in Southern Rhodesia. In 1931 the United Kingdom imported some 19,000 tons of magnesite; one-third of this was in the form of crude magnesite obtained almost entirely from Greece, While the remaining two-thirds was dead-burnt and lightly calcined magnesite obtained chiefly from Austria and Greece, although Canada supplied 1,300 tons and India 176 tons.

Magnesite is chiefly used, after being "dead burnt" at 1,500° C. as a refractory for lining steel furnaces, but in this country it has to compete with domestic dolomite. Calcining at a lower temperature gives "caustic calcined magnesite" which still contains up to 3 per cent. carbon dioxide, and finds considerable use in the manufacture of oxychloride or "Sorrel" cement for patent floors, stucco and plaster boards and epsom salts. Magnesium bisulphite is used in paper manufacture.

Diatomite, or kieselguhr, finds a number of uses in various chemical industries, but is, perhaps, best known to chemists as a filtering medium, although larger quantities are used for other purposes. The earth is made up of the siliceous remains of minute aquatic plants and many different varieties are usually present in the same sample. It is therefore exceedingly difficult to decide which particular type of diatom is most effective as an aid to filtration, and there is no general agreement of opinion on this matter. Important deposits are worked in England, Northern Ireland, Canada and Australia, while very extensive unworked deposits are known in Kenya and smaller ones in Scotland and elsewhere. So far as can be judged from present information, very little of this Empire diatomite is suitable for filtration purposes, that from Australia being perhaps the best, but considerations of freight render it unremunerative to bring this to Europe.

Important deposits of fuller's earth occur within the Empire, notably in the United Kingdom, India and Australia. Most of the earth produced in the United Kingdom (by far the largest Empire producer) is obtained from quarries near Reigate and Nutfield, Surrey. Fuller's earth, which is a hydrous aluminium silicate of variable composition, is characterised by the fact that it absorbs grease and also has the property of removing colouring matter from oils. Its principal use is for bleaching and clarifying oils, fats, waxes, etc., but its original use for fulling or removing grease from cloth has been almost entirely superseded by other methods. Other uses are as a carrier for certain pigments, as a filler for paper, as an ingredient of some soaps, and for medical and toilet purposes.

There is a considerable demand at the present time for base-exchange water-softening materials, both natural and artificial, for use in factories and households. The only natural mineral used to any extent for this purpose is glauconite, but most of the commercial supplies of this mineral come from the United States. It is not generally known, however, the extensive deposits containing glauconite are available in Western Australia. The mineral is prepared for use in Australia where it already enjoys a considerable reputation. Some has recently been brought to this country and it is claimed that it is superior in water-softening properties to that imported from the United States.

Meeting Other Industrial Needs

Among other minerals of interest to the chemical industry may be mentioned those of arsenic, cadmium, cobalt, selenium and strontium, all of which, with the exception of the last named, are recovered as by-products from metallurgical operations. Arsenic is usually obtained in the form of white arsenic or flue dust derived principally as a by-product, from the roasting of certain ores of gold, tin, silver, nickel, etc. Canada, Australia and the United Kingdom are the most important Empire producers, the total output from the United Kingdom since 1870 being estimated at some 200,000 tons. White arsenic is used in the manufacture of insecticides (calcium and lead arsenates), weed-killers (sodium arsenite), cattle and sheep dips, and as a wood preservative. The rapid expansion of the cadmium industry during recent years has been due primarily to the popularity of cadmium plating and the manufacture of "cadmopone," a cadmium pigment similar to lithopone. The metal is obtained entirely as a by-product during the metallurgical treatment of certain lead and zinc ores, and is recovered in considerable quantities in Australia and Canada. In 1932 the cadmium output of the Electrolytic Zinc Co., of Australia, amounted to 354,620 lb. while that of the Consolidated Mining and Smelting Co. was 65,425 lb. The Flin Flon zinc refinery of the Hudson Bay Mining and Smelting Co. also produces residues containing cadmium.

Cobalt is generally obtained as a by-product in the refining of other metals such as copper, lead and zinc. In 1924 the Empire produced practically the whole of the world's output of the metal, largely from Canada, but in that year the Belgian Congo commenced to be a serious competitor. Canada, India and Australia are at present the most important Empire producers, but early in the present year an output from Northern Rhodesia was recorded, and it is anticipated that both cobalt and ferro-cobalt will be produced on a commercial scale in the near future from the blister copper obtained at the N'Kana mine, which contains some 3 per cent. cobalt. Cobalt is employed chiefly in the manufacture of high-speed steels, but it is also used as a colouring agent and for making pigments and "driers." Selenium is obtained as a by-product from the treatment of the anode slimes and residues produced during the electrolytic refining of copper. In 1931 the Ontario Refining Company, of Canada, recorded an output of 21,500 lb. of selenium, but it is believed that this production, representing as it does the first Canadian output of the metal, can be considerably increased. Small quantities of selenium are also produced in Australia. The material finds its chief application in the glass and photo-electric industries, sodium selenite being used in the former industry for the decolorisation of bottle glass, etc. For strontium only celestite, the sulphate, is exploited in relatively large quantities in the British Empire, the United Kingdom being the largest contributor to the world's production. This mineral is mined in the vicinity of Yate, in Gloucestershire, and is used chiefly in sugar refining and for making "red fire" in connection with pyrotechnic displays.

The Chemical Industry of Canada

Production and Trade during 1932

BUSINESS conditions in Canada during 1932 reflected a continuance of the depression which has gripped this country in common with the rest of the world during the past three years. The official index of the physical volume of business as compiled by the Dominion Bureau of Statistics stood at 72.6 in December, 1932, as compared with 83.6 at the close of 1931. Few bright spots appeared on the business horizon as world political and monetary conditions remained unsettled wholesale prices continued to fall and practically all phases of commercial activity continued the downward trends. Nevertheless, the decline in industrial production and in manufacturing operations was not nearly so severe as in either of the two preceding years and there were indications of greater resistance to the prevailing downward tendency which has been in evidence since 1929. The low point for the index of business was reached in December, 1932, at 72.6 which, it will be noted was still considerably above the low average for 1921.

In the chemical industry, according to a report by W. H. Losee and H. McLeod, of the Mining, Metallurgical and Chemical Branch, Dominion Bureau of Statistics, the preliminary figures for 1932 indicate a decline of 9.5 per cent. from the production value for 1931. This value of 95,540,346 dollars was considerably above the corresponding figure for 1921 and 1922 in spite of a price decline of approximately 25 per cent. in the intervening period. The index number of wholesale prices for chemicals as based on quotations for 73 representative chemicals averaged 84.0 in 1932 which was 2.7 points lower than in 1931 and much more below the index for earlier years.

New Plants and Products

Notwithstanding the further drop in output value, the year 1932 was not an unimportant one so far as Canada's chemical trade is concerned. A number of new factories were opened during the year, particularly in the fields of medicinals, toilet preparations, etc., and for the industry as a whole the new concerns exceeded the number which were forced out of business, the records showing an increase of seven establishments in spite of adverse conditions. Of more importance is the number of additions which were made in 1932 and early 1933 to the list of "made-in-Canada" chemicals. Among these may be mentioned phenol, cresol and other tar derivatives, by the Dominion Tar and Chemical Co., Ltd.; liquid sulphur dioxide, sulphur dichloride, and chemically pure ammonia by Canadian Industries, Ltd., and acid calcium phosphate and sodium phosphate by the Electric Reduction Co. Cellophane is now made by Canadian Industries, Ltd., at Shawinigan Falls. The Mallinckrodt Chemical Works and Merck and Co. have added to the variety of fine chemicals which are made in their Canadian factories. The huge chemical and fertiliser works of Consolidated Mining and Smelting Co. at Trail continued its development programme and reported a large tonnage of ammonium phosphate for the first time. Sodium silicate, it is reported, will soon be manufactured in Canada. A new zinc oxide plant is now being built in Montreal, and no doubt there are other similar developments of which we have no record at the moment.

Trade and Tariffs

Probably first place in the year's events of 1932 should be given to the Imperial Economic Conference which met in Ottawa during July and August as the provisions arising out of this gathering may have a pronounced effect on the Canadian chemical industry. A great number of chemicals have been included in the 223 items on which tariff changes have been announced as a result of the conference. The general intention has been to provide easier access to Canadian markets for the British manufacturers as Canada obtains very few chemicals from other Empire countries. This has been done by raising the general tariff rate while leaving the British preferential rate as before, or by lowering or abolishing the existing tariff against the British producer. These changes will affect the Canadian chemical trade in several ways. In the first place there will be the obvious realignment of imports with a considerable increase in the proportion obtained from the United Kingdom which formerly supplied only about 13 per cent. of the Canadian market. Secondly, it is reasonable to expect that the additional barrier against foreign manufacturers will be an incentive to establish branch plants in Canada; this will apply more particularly to producers in the United States who formerly supplied about 65 per cent. of total imports of chemicals. Lastly, the Canadian manufacturer may now find that he is able to produce in Canada some of the chemicals which previously were purchased abroad. About 84 per cent. of Canadian chemical imports have been from other than Empire countries and at least some part of this business must now meet increased tariff rates With this additional protection the Canadian producers may be able to compete favourably with foreign and British houses.

Output of Chemicals

As far as the official statistics are concerned the chemical industry is restricted to include the concerns which make chemicals and chemical products such as paints and drugs. The Bureau of Statistics has adopted the chief component material classification under which the division is into major groups such as vegetable products, animal products, wood products, chemicals and allied products, etc., according to the nature of the principal materials used. Pulp and paper comes under wood products, sugar refining falls under vegetable products and similarly with other industries which use chemical processes. Output of chemicals and allied products were valued at $95,540,346 in 1932, as compared with $105,501,905 in 1931.

Of the 15 groups into which the chemical industry has been divided, acids and salts, medicinals and polishes showed higher values than the the previous year. In the coal tar distillation industry the same 10 works were in operation as in 1931, the new unit of the Dominion Tar and Chemical Co. at Toronto for making coal tar derivatives being included with the report for their tar distillery in that city. Output dropped 18 per cent. in value to $2,114,650. The acids and salts group increased output by about 4 per cent. to $11,357,649. There was no change in the operating plants. Compressed gases declined 11 per cent. to $2,504,549 in spite of the fact that reports were included from one additional hydrogen plant and one nitrous oxide plant. Explosives, ammunition and fireworks showed a drop of 16 per cent. to $7,184,074. Fertilisers with two additional factories failed to reach the total for 1931 by almost 2 per cent. The 20 establishments reported production at $4,176,193 in 1932. Medicinals and pharmaceuticals, the most important of the entire group in point of value, made a slight gain to $18,145,573 with 141 factories in operation. Paints and varnishes, second in importance, declined more than 18 per cent. to $15,085,357. The recession of about 7 per cent. in prices of paints and paint products in 1932 partly accounts for the severity of the decline in this industry. Soaps and washing compounds were valued at $14,734,549, a drop of about 14 per cent.

Industrial Acids

Most of the industrial acids which we consume are of domestic manufacture. Canada's production of acids of all kinds was in the neighbourhood of $2,500,000 in 1932. Imports were valued at $871,642, mostly boracic, citric, oxalic, tartaric, stearic, cresylic and other organic acids. Exports were reported at $1,872,310.

Sulphuric acid was made in seven different plants in 1932. Canadian Industries, Ltd., have works at Copper Cliff, Ontario; Hamilton, Ont.; and New Westminster, B.C. The Consolidated Mining and Smelting Co. of Canada operate a plant at Trail, B.C., chiefly for their own use in the manufacture of synthetic fertilisers. Dominion Steel and Coal Corporation at Sydney, N.S., produce acid for use in their steel mills and for making ammonium sulphate from their coke-oven liquors. Nichols Chemical Co., Ltd., produce for sale at Sulphide, Ontario, and Barnet, B.C. The works of Copper Cliff and Trail operate on smelter gases; the other plants used 12,465 tons of pyrites and 9,091 tons of sulphur in 1932. Production of sulphuric acid in 1932 was

133,151 tons. Imports amounted to only 62 tons and exports to 712 tons. Nitric acid is made for sale by the Nichols Chemical Co., at Sulphide, Ontario., and by Canadian Industries, Ltd., at Hamilton, Ontario. In addition the three explosives plants of Canadian Industries, Ltd., manufacture nitric acid for their own use. In connection with the explossive works at Beloeil, a synthetic acid plant was built a year or two ago to utilise the ammonia which is now produced in the company's plant at Sandwich, Ontario. The rest of the nitric acid is made from sodium nitrate. The approximate output for all purposes was 4,000 tons. Imports were 83 tons while exports were negligible. Hydrochloric is made at Sandwich, Ontaria, as a product of electrolysis of salt brine, and at Hamilton, Ontario, and New Westminster, B.C. All three plants are operated by Canadian Industries, Ltd. Imports in 1932 were given at 103 tons, all from the United States.

Glacial acetic acid is made only by Shawinigan Chemicals, Ltd., at Shawinigan Falls, P.Q., but the 28 per cent. grade is made at Hamilton, Ontario, by Canadian Industries, Ltd., and at Montreal by the Standard Chemical Co. Phosphoric acid, technical and pharmaceutical grades, is made for sale by the Electric Reduction Co., at Buckingham, P.Q., while the Consolidated Mining and Smelting Co., at Trail, have put their new plant in operation and now manufacture phosphoric acid for their own use in making phosphate fertilisers. Hydrofluosilic acid is manufactured by the Consolidated Mining and Smelting Co., at Trail, for use in the metallurgical treatment of zinc ores in their own works. About 10 tons of this acid was imported into Canada in 1932. Coal tar acids are now made by the Dominion Tar and Chemical Co., at Toronto. This works produces cresylic acid and high boiling acids. Arsenious acid is made by the Deloro Smelting and Refining Co. in their smelter at Deloro, Ontario.

Sodium and Potassium Compounds

Sodium compounds make up a considerable portion of the Canadian output. Soda ash is made by Brunner Mond, Ltd., at Amherstburg, Ontaria; caustic soda and sodium hypochlorite are produced in the Sandwich works of Canadian Industries, Ltd.; sodium cyanide is made by the American Cyanamide Co., at Niagara Falls, Ontario; and sodium phosphate is now being manufactured by the Electric Reduction Co., at Buckingham, P.Q. At Copper Cliff, Ontario, nitre cake is made by Canadian Industries, Ltd., for use in the refining of nickel-copper matte and some is also recovered as a by-product in the Nobel explosives plant of the same company. The Nichols Chemical Co., at Sulphide, also make some nitre cake. Glauber's salt and salt cake is made by Canadian Industries, Ltd., at Hamilton, and this concern also has salt cake as a by-product of their dynamite plant at James Island, B.C. Sodium bisulphite is manufactured by Yocum Faust, Ltd., who have recently expanded their works at London, Ontario. Sodium arsenite is produced by Chipman Chemicals, Ltd., at Winnipeg, and some sodium arsenate is reported by the Oliver Chemical Co., at Penticton, B.C. Fine sodium salts are made by Merck and Co., Mallinckrodt Chemical Works, Ltd., and the Synthetic Drug Co., Ltd., all of Montreal; their products include sodium citrate, sodium iodide, sodium lactate, and sodium salicylate. Sal soda is manufactured by the Diamond Cleanser Co., at Toronto, Ontario. The total output of sodium compounds was valued at about $4,600,000 in 1932. Imports amounted to $3,134,884, consisting chiefly of silicate, nitrate, cyanide, phosphate bicarbonate, bichromate, prussiate, sulphide and caustic soda in packages. Exports were appraised at $2,712,658.

Imports of potassium compounds in 1932 were valued at $952,496 including muriate, chlorate and cream of tartar as the leading items. The only potassium salts made in Canada are produced by Merck and Co. and Mallinckrodt Chemical Works and include acetate, citrate, iodide and possibly some others.

Calcium and Ammonia

Calcium compounds produced in Canada include carbide by Shawinigan Chemicals, Ltd., at Shawinigan Falls, P.Q., cyanamide by the American Cyanamid Co., at Niagara Falls, Ontario, calcium arsenate by Niagara Brand Spray Co., at Burlington, Ontario; grey acetate of lime by Standard Chemical Co., Ltd., and acid calcium phosphate by the Electric Reduction Co., at Buckingham, P.Q. Superphosphate is made by the Consolidated Mining and Smelting Co., at Trail, and by Canadian Industries, Ltd., at Hamilton, Ontario, Beloeil, P.Q., and New Westminster, B.C. Imports of calcium compounds were valued at $615,108 in 1932, the chief item being calcium chloride.

Phosphorus is made by the Electric Reduction Co., at Buckingham. This company also makes phosphoric acid, sodium phosphate and ferro-phosphorus. The only other producer of phosphorus compounds is the Consolidated Mining and Smelting Co. which now makes large tonnages of ammonium phosphate fertiliser at Trail, B.C.

Ammonia and its compounds are now an important group of domestic manufactures. Synthetic ammonia is now made by Canadian Industries, Ltd., at Sandwich, Ontario, and by the Consolidated Mining and Smelting Co., Ltd., at Trail, B.C., the ouput of the former being used to make nitric acid and of the latter to make synthetic ammonium sulphate and ammonium phosphate. Ammonium sulphate is also made in several coke and gas plants. Ammonium iodide, iron-ammonium citrate and iron-ammonium oxalate are made by the Mallinckrodt Chemical Works, Ltd., at Montreal.

Metallic Salts

Among the metal salts, nickel oxide is recovered in the refineries of the International Nickel Co. of Canada, Ltd., and the Deloro Smelting and Refining Co., Ltd. The latter company also produces cobalt oxide and arsenious oxide. Red lead and litharge are made by the Carter White Lead Co., at Montreal. Zinc oxide is manufactured by the Watts Chemical Co., at Toronto, and another company is now building in Montreal. White lead is corroded by Brandram-Henderson, Ltd., Carter White Lead Co., and McArthur, Irwin, Ltd., all of Montreal. Lead arsenate is made by Niagara Brand Spray Co., Ltd., at Burlington, Ontario. Metallic salts for plating are produced by Canadian Hanson and Van Winkle Co., at Toronto. Mercury salts, bismuth salts, cadmium salts and silver salts are made in the fine chemical plants operated by Merck and Co., Ltd., and Mallinckrodt Chemical Works, Ltd. Coal tar chemicals are made only by the Dominion Tar and Chemical Co., at Toronto. Their products include phenol, cresol, ortho cresol, meta para cresol, xylenols, cresylic acid, high boiling acids, etc. The Steel Co. of Canada produces xylol and toluol. Compressed gases which are made in Canada include carbon dioxide, acetylene, oxygen, hydrogen, nitrous oxide, ammonia and liquid chlorine. Wood alcohol is made in several distillation plants by the Standard Chemical Co., Ltd. The same company produces formaldehyde in its Montreal refinery. Ethyl alcohol both potable and non-potable is produced in a large number of liquor distilleries. Special mention must also be made of the works of Shawinigan Chemicals, Ltd., at Shawinigan Falls, P.Q. This plant, which is one of the great industries of the Empire, produces calcium carbide and an extensive line of derivatives therefrom including acetic acid, acetylene black, ethyl acetate, butyl acetate, amyl acetate, vinylacetate, paraldehyde and croton aldehyde.

Imports and Exports

Turning again to foreign trade in chemicals it is found that imports dropped off by $3,500,000 in 1932 to $27,861,580, the lowest value since 1925. Purchases from the United States totalled $17,275,161 which was only 62 per cent. of the total imports as compared with an average of about 67 per cent. in the previous five-year period. On the other hand, imports from the United Kingdom were valued at $4,719,074 or 17 per cent. of the total as against 13 per cent. in the preceding years. In general it may be said that the tendency of Canada's trade during the past few years, quite apart from trade agreements, has been towards a greater exchange of commodities with Empire countries, and it is quite likely that this movement is being reflected in the chemical trade. It is also likely that monetary conditions have accentuated this tendency in 1932. Exports of chemicals from Canada increased slightly in 1932, the total value being $11,033,179, as compared with $10,848,946 in 1931. United States, United Kingdom, Mexico, Portuguese Africa, Newfoundland, Hawaii, Australia, British India, Netherlands, Cuba and China in the order named, were the main purchasers, and the main articles exported were acids, cyanamide, sodium compounds, ammonium sulphate, medicinals, paints and soaps.

Works Equipment News

Remote Control of Valves

THE new Copes thrustor-operated control valve, introduced by Copes Regulators, Ltd., has an immediate application wherever centralised remote control is desired for flows of gases or liquids under pressure. Such a valve opens up a new field of application, for centralised remote control of flows of gases and liquids under pressure is a field of increasing interest still in the development state. In almost every process industry unlimited possibilities present themselves, as with oil refineries, pulp and paper mills, sugar mills and breweries. This new unit is operated by an electro-hydraulic thrustor mounted at the side of the valve by a bracket firmly bolted to the valve bonnet The thrustor, which is the patent of the British Thomson-Houston Co., Ltd., applies a straight-line constant pressure thrust directly

The Copes Valve with Electrically-Operated Thrustor

on the valve lever, to fully open or close it, depending on the service requirements. Power for thrustor operation is absorbed in one direction only, the weight acting to return the valve lever to the original position when the electrical current is thrown off. Valve movement can be controlled by a push button or time switch. When the thrustor is connected for valve opening a time lag device can be fitted to the thrustor to give a slow return stroke. The adjustment is external, and controls the flow of oil from the lower to the upper chamber of the thrustor. This permits slow closing of the valve without shock or hammer in the pipe line, even with conditions of large flow and high pressures.

The characteristics of the thrustor are such that the motor cannot be overloaded, regardless of the amount of valve opening. Full torque is secured at the start of the thrustor stroke; limit switches are not needed to control the opening or closing of the valve. The amount of current used is about 175 watts. The valve unit, as a whole, is positive in action, requiring less time to operate than the ordinary motor driven valve. The thrustor will operate the valve up to a rate of 35 times per minute without injury to any part of the unit, and it has sufficient power to handle heavy viscous liquids. It can be applied to all standard Copes valves, in sizes from ¾ in. to 6 in., for any working pressure.

The following representative uses for the Copes thrustor valve unit have been suggested by the makers. For water level control a float switch, mounted at a predetermined level in a tank, could be connected to the thrustor. When the level reaches this predetermined point, the float closes the circuit; when the circuit is closed the thrustor acts to close the valve, but at all other times the weight on the lever holds the valve open. The " watering " of ore can also be controlled automatically when charging a blast furnace, by a time switch which throws the valve open for a certain number of seconds, as required, to give the charge of the exact amount of water necessary. A valve required to furnish water in emergency for fire purposes could always be held closed by the weight on the valve lever; a push button switch would put the thrustor into action immediately, giving full valve opening. In process work, such the " cooking " of soap, a thrustor valve can quickly and positively shut off the steam supply to the kettle when the process is completed. For coke quenching, where, at long intervals, a large quantity of water is instantly required, a Coper thrustor valve unit, with remote control and time switch, gives an ideal arrangement. Among other uses are the controlling of make-up water to feed water heaters; controlling water level in open tanks; regulating evaporator flows; regulating make-up water to a return tank or heating system; controlling sump pumps; reducing valve control; regulating steam to engine, in forced or induced draught systems; controlling steam supply to stoker engines; and manual control of flow for test purposes. There are, of course, many special cases where such a valve and thruster may be profitably installed at chemical works.

Low-Temperature Welding

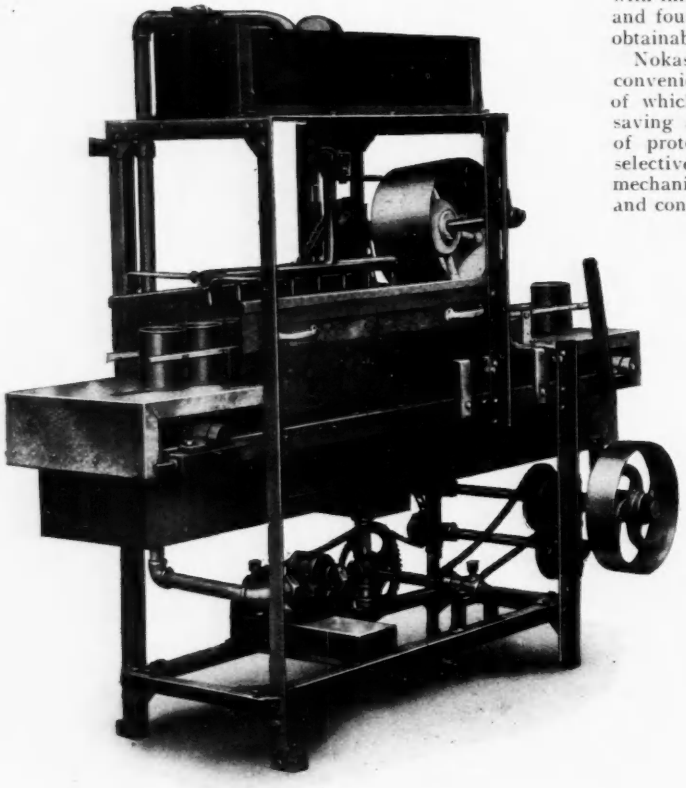
A WELDING process for cast iron which gives perfect amalgamation and fusion at only half the temperature hitherto required is the latest innovation of Barimar, Ltd. This remarkable advance in welding science has been made possible by the perfection of entirely new methods and materials. It entails a revolutionary change in the manner in which the flame of the blow-pipe is applied and involves great skill on the part of the operators. Further, it calls for the use of special anti-oxide fluxing componds and ferreous welding rods of a new composition which the company has evolved after exhaustive experiments. Entirely new methods of heat treatment have been introduced to ensure the absolute reliability of welded repairs effected by the new process and they remove the last vestige of risk in connection with distortion.

The practical advantages of the new process are immense. Cylinder blocks and similar large castings can be welded without completely dismantling them and all the difficulties associated with repairing have been overcome. Even machining has been facilitated and the deposited metal can, when necessary, be worked with a file. Having a very close-grained structure this material is, however, longer wearing than ordinary cast iron completely free from porosity and offers exceptional resistance to corrosion and attack by hot gases. The new process is therefore ideal for the reconditioning of exhaust valve seatings and the repairing of cracks and fractures in close proximity to them. Not only does it resist burning but it is better able to withstand the impact of valves than is the metal which is normally used for cylinder castings. This new Barimar process is already being used not only for repairing small cracks and fractures and

for building up valve seatings but also for extensive repairs. Malleable metal as well as cast iron can now be welded at temperatures no higher than those employed in brazing and in every case the welds are stronger than the original material. The cost of this latest process is lower than the high-temperature welding which has been employed hitherto. Less gas is used and there is a big saving in the time required for machining.

Canning Industry Plant

THE progress made by the canning industry in this country has necessitated a new development in the designing and manufacturer of the plant. C. A. Harvey and Co. (London) Ltd., are securing a share of this increasing business and illustrate here a recent product from this new department, known as a straight-line syruper and briner. This machine



A Straight-line Syruper and Briner for Canning Factories

is adjustable for various size cans or jars which are fed continuously from the canning table on to the metallised conveyor chain, which carries the cans along under a series of streams of syrup or brine. After filling, they are automatically tilted to creat proper head space, after which they pass to the "Tucker" exhaust box. The excess syrup from the cans is pumped through a brass gear type syrup pump into the storage tank on top of the machine, which is fitted with a float valve controlling the flow of syrup or brine to the machine. This syruper can be continuously fed from the canning table or alternatively provided with a hand feeding table only. The overall measurement of the machine is 6 ft. 6 in. long, 2 ft. 6 in. wide, 5 ft. 2 in. high, and the power unit required to operate is only ½ h.p. The storage tanks are made in this instance of monel metal, but stainless steel can be used if preferred. Pipe-lines are in brass; thus the possibility of the food product becoming contaminated is avoided.

Case Hardening and Anti-Carburising

THE increased sales of Kleenard open hearth hardening compound reported by G. W. B. Furnaces, Ltd., leave no doubt with regard to its popularity, and for the convenience of users, additional size tins have been added to the list, and owing to its low specific gravity and rapid penetrating qualities, it is widely adopted. The high qualities of the product are dealt with under four main headings, and in every feature the user is offered definite advantages which are exclusive to Kleenard. Firstly, as open hearth compounds are bought by weight, but used by volume, it is obvious that a compound of low density is the most economical in use. In most cases, other compounds have only half the volume for a given weight as compared with Kleenard. Secondly, a perfectly bright surface is obtained from the use of Kleenard, and the usual pitting and discolouration is absent, thereby ensuring cleanliness of finished work; the third advantage is that the greatest possible pentration in a given time is obtained with this material, whilst the hardness is absolutely file proof, and fourthly the firm claim that their product is the cheapest obtainable.

Nokase anti-carburising mixtures are made for the users' convenience in three forms, clay, paint and powder, all of which are certain protectives, and gives a considerable saving as compared with the alternative expensive methods of protection which are by electrically deposited copper, selective packing, or the removal of the unwanted case by mechanical means. The materials used are specially selected, and consistently good results are thus assured.

The "Q.P." Emulsifier for Experimental and Laboratory Use

A Laboratory Emulsifier

THE making up a small quantities of satisfactory and stable emulsions for experimental or test purposes is usually a difficult and tedious matter. The "Q.P." laboratory emulsifier, a small hand-operated apparatus, which is both quick in operation and highly efficient, is being manufactured by Ormerod Engineers, Ltd. The desired constituents are first mixed and then poured into the hopper of the machine. It is then only necessary to work the handle of the machine, which operates a reciprocating plunger, when the emulsion issues at once into a requisite beaker placed to receive same. The working parts, including the pump plunger, non-return valve and emulsifying device are of stainless steel or non-corrosive alloys. The emulsifying device is of special design and has proved highly satisfactory in use. The machine is compact, takes but a few minutes to clean after use, and is supplied complete with bench clamp. It is a valuable adjunct to a large power machine and all manufacturers of commercial emulsions. Not only can small quantities and experimental emulsions be made without the trouble of operating and cleaning the large machine, but tests can also be made to determine the emulsifying qualities of materials.

News from the Allied Industries

Paper

THE EUROPEAN SULPHITE CELLULOSE SUPPLIERS, representing Finland, Norway, Sweden, Czechoslovakia , Germany, Austria and Lithuania, meeting at Copenhagen, have agreed to continue co-operating until the end of 1934. A continued improvement in the trade situation was reported.

Carbonisation

A PROPOSAL TO CONVERT the £100,000 income debenture stock of Low Temperature Carbonisation, Ltd., to a new long term first debenture stock , bearing interest at 6 per cent. per annuum, is announced in a letter to stockholders issued by the board on July 8. Instead of exercising its right to redeem the income debenture stock at six months' notice, the board offers holders £115 of new 6 per cent. first debenture stock for each £100 of the old stock. Interest will be payable on the new stock as from November 1, 1932, and the first half year's interest to May 1, 1933, will be paid in cash immediately the scheme is approved. The scheme, which will considerably strengthen the financial structure of the company, will be submitted to a meeting of stockholders on July 17.

Iron and Steel

CONSIDERABLE CONCERN is felt in West Hartlepool regarding the future of the South Durham Steel and Iron Co.'s works there, because of the projected amalgamation with Dorman, Long and Co. It is feared that in the reorganisation which will follow, the West Hartlepool works may be closed down. It is suggested that one of the terms of the projected amalgamation provides specifically for the closing of these works, which have been the town's principal industrial asset for the past few years. The local shipyards have been without work for many months, and the steel works are the most important centre of employment.

Glue and Gelatine

STOCKS OF GLUE IN THIS COUNTRY are still far too heavy, yet Russian glue is coming in at lower prices than ever, with the consequence that glue manufacture in this country is inadequately remunerative, said Mr. T. Walton, the chairman of British Glues and Chemicals, Ltd., on the occasion of the Company's thirteenth ordinary general meeting, held in London, on July 4. "Churn Brand" products, added Mr. Walton, continue to make headway, particularly in the direction of protein and mineral concentrates for all classes of farm stocks. The long-continued extraordinarily low prices of greases and tallow, and the restriction of export markets by tariffs and the vagaries of exchanges, have induced the company to absorb a part of their production of these commodities in the manufacture of commercial and household soap, soap flakes, and soap powders; and the company now sell an increasing proportion of their glues in the form of liquid, bead, flake, and powder glues where those forms are the more convenient to the user.

Mineral Oil

THE NEW AGREEMENT between the Anglo-Persian Oil Co. and the Persian Government has opened a new phase of the company's history. Shareholders have already had the benefit and guidance of a statement from the board but the elaboration of that statement by Sir John Cadman at the 24th ordinary general meeting of the company, held on July 11, was a welcome addendum. The original terms of agreement had been in need of modernisation, and the alteration though it improves the position of the Government, also benefits the company. The concessionally zone is eventually to be 100,000 square miles, and as it was chosen by the company, may be assumed to comprise the richest portion. It is, at any rate sufficiently large for the requirements of the undertaking. Moreover, the new concession has 32 years longer life than the old. Other important factors in the new relationship include an arrangement by which, for the next thirty years, the company knows its precise annual liability for taxation in Persia, while the profit-sharing agreement gives the Persian Government a progressive interest in the operations of the company.

Canning

AN IMPETUS TO LANCASHIRE AGRICULTURE is expected from the opening of W. P. Hartley's new vegetable canning factory at Aintree. At present the firm is dealing with fresh garden peas, but within another twelve months they will be canning asparagus, beets, and carrots. The whole process from the shelling of the pees, washing, winnowing and grading, to the finished canned product, is carried out entirely by machinery. The manufacturers have made arrangements with 45 farmers in the area to take all the peas they can supply. The new venture has resulted in over a hundred extra people being employed at Aintree, while at least 400 extra people have found work on the land.

Patent Dispute

Appeal to Amend Specification

IN the Chancery Division on Tuesday Mr. Justice Luxmore had before him a petition under the Patents and Designs Act, 1907-1932, by British Celanese, Ltd., appealing against leave given the British Dyestuffs Corporation, Ltd., to amend the specification of Patent No. 211,720.

Mr. E. J. C. Neep appeared for British Celanese and Mr. Whitehead, K.C., and Mr. Lloyd Jacobs for the British Dyestuffs Corporation.

Mr. Neep said his clients were the opponents in the court below and the British Dyestuffs were the applicants. The matter was concerned with an application which was made to the Patent Office for leave to amend the specification of 211,720 and as a result leave was given to amend and his clients were appealing.

Substantially, said counsel, he was concerned with two of those amendments. The effect of the first was to widen the scope of the invention by bringing in bodies which were previously out. With regard to the second amendment his case was that the effect of the amendments was to keep certain bodies out which were previously in and that it would bring in bodies which were previously out. The patent in question dealt with the dyeing of cellulose acetate silk by certain types of dyes such as anthraquinone. Cellulose acetate silk was an essentially post-war creation and his clients had built up a large industry in it. This new artificial silk required to be dyed. In the earlier days considerable trouble was experience in dyeing their new product. Patent No. 211,720 was concerned with the dying of cellulose with amonal anthraquinone and was dated March 8, 1923, and it was the first patent specification which disclosed such dyeing. The specification which brought about the modern methods of dyeing was No. 182,830, the application for which was in 1921. His clients' patent was an improvement on the specification.

His Lordship, after hearing technical arguments, said he could not put the construction on the first amendment which counsel had submitted. With regard to the second part of the specification he thought it was in one respect too wide. He saw no ambiguity in any of the amendments allowed and he dismissed the appeal, except as to the certain lines on page 3, which were too wide.

New Dyestuff Licences

Applications in June

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during June has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee. The total number of applications received during the month was 575, of which 464 were from merchants or importers. To these should be added the three cases outstanding on May 31, making a total for the month of 578. These were dealt with as follows:—Granted, 552 (of which 548 were dealt with within seven days of receipt). Referred to British makers of similar products, 19 (of which 15 were dealt with within seven days of receipt); outstanding on June 30, seven. Of the total of 578 applications received, 563 or 97 per cent. were dealt with within seven days of receipt.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

MANUFACTURE OF CYCLIC DIETHERS.—H. Dreyfus. Nov. 30, 1931. 394,678.

MANUFACTURE OF CYCLIC ETHERS.—H. Dreyfus. Nov. 30, 1931. 394,679.

ROASTING OF SULPHIDE ORES.—K. W. Young and Imperial Chemical Industries, Ltd. Dec. 15, 1931. 394,650.

HYDRATION OF OLEFINES.—H. Dreyfus. Dec. 22, 1931. 394,674.

PROCESSES FOR CARBURISING OR NITROGENISING FERROUS OR FERROUS ALLOY ARTICLES.—Hevi-Duty Electric Co. Dec. 24, 1930. 394,700.

REDUCTION OF ZINC ORES.—W. A. Ogg. Jan. 15, 1931. 394,682.

REMOVAL OF AMMONIA FROM FUEL GAS.—Koppers Co. of Delaware. Dec. 27, 1930. 394,666.

MANUFACTURE OF ARTIFICIAL STAPLE FIBRE.—British Celanese, Ltd., and W. I. Taylor. Dec. 30, 1931. 394,702.

MANUFACTURE OF ALIPHATIC ANHYDRIDES.—H. Dreyfus. Dec. 31, 1931. 394,689.

MANUFACTURE OF CARBO-CYANINE DYES.—Kodak, Ltd. Dec. 31, 1930. 394,692.

VULCANISATION OF NATURAL RUBBER AND ARTIFICIAL RUBBER-LIKE MASSES.—I. G. Farbenindustrie. Dec. 31, 1930. 394,693.

CELLULOSE DERIVATIVES.—H. Dreyfus. Jan. 6, 1932. 394,722.

MANUFACTURE OF RUBBER ARTICLES RESISTANT TO OIL AND THE LIKE.—B. D. Porritt, T. R. Dawson, J. R. Scott, and Research Association of British Rubber Manufacturers. Jan. 12, 1932. 394,730.

HEAT TREATMENT OF HYDROCARBON OILS.—Standard Oil Co. Feb. 9, 1931. 394,745.

ALUMINIUM ALLOYS AND METHODS OF TREATING SAME.—Light-alloys, Ltd., and W. H. Grieve. Feb. 5, 1932. 394,746.

APPARATUS FOR THE GASIFICATION OF FUELS WHICH TEND TO AGGLOMERATE.—J. Y. Johnson (I. G. Farbenindustrie). Feb. 8, 1932. 394,747.

MANUFACTURE OF RUBBER COMPOSITIONS.—Dunlop Rubber Co., Ltd., D. F. Twiss and F. A. Jones. Feb. 18, 1932. 394,754.

TREATMENT OF ARTIFICIAL SILKS.—C. Clemencon. May 4, 1932. 394,793.

PROCESS FOR MANUFACTURING A SOLVENT PRODUCT FOR THE TEXTILE INDUSTRY AND PRODUCT DERIVED THEREFROM.—R. Meunier. Sept. 19, 1932. 394,843.

PROCESSES OF TREATING OXIDISED ORES.—Meyer Mineral Separation Co. Oct. 7, 1931. 394,845.

PROCESS OF, AND APPARATUS FOR, THE CONVERSION OF HYDROCARBON OILS.—A. L. Mond (Universal Oil Products Co.). Nov. 1, 1932. 394,867.

PROCESS FOR THE MANUFACTURE OF THE TETRASULPHURIC ACID ESTER OF LEUCO-1.2.2^1.1^1-ANTHRAQUINONE AZINE.—I. G. Farbenindustrie. Dec. 29, 1931. 394,887.

MANUFACTURE AND PRODUCTION OF NICKEL CARBONYL.—I. G. Farbenindustrie. Feb. 3, 1932. 394,905.

REMOVAL OF HYDROGEN SULPHIDE FROM COMBUSTIBLE GASES.—C. J. Hansen. Feb. 11, 1932. 394,917.

Complete Specifications Open to Public Inspection

DYESTUFFS AND THEIR APPLICATION.—Soc. of Chemical Industry in Basle. Dec. 31, 1931. 15987/32.

PROCESS OF PRODUCING A NATURAL FISH OIL OF HIGH THERAPEUTIC VALUE AND THE PRODUCT THEREOF.—Abbott Laboratories. Dec. 29, 1931. 27936/32.

MANUFACTURE OF HIGH MOLECULAR OXYGEN AND THIO ETHERS.—Henkel and Cie. Dec. 29, 1931. 29998/32.

COMPOSITIONS COMPRISING HYDRO-FORMED SOLVENTS.—Standard Oil Development Co. Dec. 29, 1931. 32126/32.

PROCESS FOR THE MANUFACTURE OF THE TETRASULPHURIC ACID ESTER OF LEUCO-1.2.2^1.1^1-ANTHRAQUINONE AZINE.—I. G. Farbenindustrie. Dec. 29, 1931. 36785/32.

PROCESS FOR THE PRODUCTION OF HIGHLY CONCENTRATED NITRIC ACID.—Dr. N. Caro and Dr. A. R. Frank. Dec. 30, 1931. 36941/32.

CATALYTIC PRODUCTION OF ALCOHOLS AND ALCOHOLIC DERIVATIVES. Imperial Chemical Industries, Ltd. Jan. 2, 1932. 86/33.

Applications for Patents

VULCANISATION OF RUBBER.—W. Baird, Imperial Chemical Industries and J. Davies. July 7. 19331.

MANUFACTURE OF FILMS, ETC., FROM CELLULOSE ESTERS, ETC.—E. Berl. July 6. 19143.

STABILISING PEROXIDE SOLUTIONS.—H. T. Böhme. July 3. (Germany, July 28, '32.) 18847.

MANUFACTURE OF VAT DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie). July 7. 19325.

MANUFACTURE OF 1-AMINO-2,3-DIMETHYL-ANTHRAQUINONE.—A. Carpmael (I. G. Farbenindustrie). July 7. 19326.

MANUFACTURE OF DYESTUFFS.—Deutsche Hydrierwerke. July 7. (Germany, July 8, '32.) 19344.

MANUFACTURE OF SYNTHETIC RESINS, ETC.—E. I. Du Pont de Nemours and Co. July 5. (United States, July 5, '32.) 19118, 19119.

MANUFACTURE OF SODIUM AUROTHIOMALATE.—G. B. Ellis (Soc. des Usines Chimique Rhône-Poulenc). July 7. 19310.

PRODUCTION OF MAGNESIUM.—R. Fouquet July 6. 19178.

AUSTENITIC CORROSION-RESISTING ALLOYS.—R. Franks.—July 6. 19164.

PROCESS FOR REMOVING IRON FROM ACID SOLUTIONS OF ALUMINIUM SALTS.—J. R. Geigy. July 6. (Germany, July 8, '32.) 19176.

PRODUCTION OF MAGNESIUM.—G. Gire. July 6. 19178.

MANUFACTURE OF GLYOXALIDINE-ARYLMETHYLOLS.—W. W. Groves (I. G. Farbenindustrie). July 4. 18067.

Chemical Market Conditions

Price Changes

THE London market continues to receive a fair volume of inquiry and the amount of business booked having regard to the seasonal influence is not unsatisfactory. Prices on the whole continue firm and unchanged. Trade on the Manchester chemical market during the past week has been rather patchy. It is probable that, on the whole, there has been an increased number of orders about, but the majority of them have been for small quantities and most buyers are content for the present to limit commitments to early needs. Certainly, few forward contracts of any consequence have been reported. The tendency of prices continues steady to firm in almost all sections. The approaching Glasgow Fair holidays are having a quietening effect on the Scottish market. The following price changes are reported:—

General Chemicals

ACID, CITRIC.—MANCHESTER: 9¾d. per lb.
LEAD, ACETATE.—MANCHESTER: Brown, £30 per ton.
POTASH, CAUSTIC.—MANCHESTER: £40 to £42 per ton.
POTASSIUM CHLORATE.—MANCHESTER: £37 10s. per ton.
SULPHATE OF COPPER.—MANCHESTER: £17 10s. per ton f.o.b.
DINITROTOLUENE.—66/68° C., 9d. per lb.

Coal Tar Products

ACID, CARBOLIC.—MANCHESTER: Crude, 2s. 8d. per gal.
CREOSOTE.—MANCHESTER: 2¼d. to 3½d. per gal.
PITCH.—MANCHESTER: £4 per ton f.o.b.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—The prices in force are as follows:—Home, £6 15s. per ton delivered in 6-ton lots to consumer's nearest station for July/August. Export, £6 5s. per ton for July shipment f.o.b. U.K. ports in single bags.

OTHER FERTILISERS.—No new prices for the 1933/34 season have yet been announced.

Latest Oil Prices

LONDON, July 12.—LINSEED OIL was firmer. Spot, small quantities, £23 15s.; July, £20 15s.; July-Aug., £21; Sept.-Oct., £21 7s. 6d.; Jan.-April, £22, naked. RAPE OIL was steady. Crude, extracted, £29; technical refined, £30 10s., naked, ex wharf. COTTON OIL was firm. Egyptian, crude, £22; refined common edible, £24 15s.; and deodorised, £26 15s., naked, ex mill. TURPENTINE was steady, American, spot, 51s. 9d. per cwt.

HULL.—LINSEED OIL.—Spot, quoted £21 10s. per ton; July, £21; July-Aug., £21 2s. 6d.; Sept.-Dec., £21 7s. 6d.; Jan.-April, £22. COTTON OIL.—Egyptian crude, spot, £22; edible refined spot, £23 10s.; technical, spot, £23 10s. deodorised, £25 10s., naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £19, naked. GROUNDNUT OIL.—Extracted, spot, £25; deodorised, £29. RAPE OIL.—Extracted, spot, £27 10s.; refined, £29. SOYA OIL.—Extracted, spot, £22 10s.; deodorised, £25 10s. per ton. COD OIL, 21s. per cwt., nominal. CASTOR OIL.—Pharmaceutical, spot, 39s.; first, 34s.; second, 31s. per cwt. TURPENTINE.—American, spot, 54s. per cwt.

From Week to Week

THIRTY CHEMICAL AND BACTERIOLOGICAL LABORATORIES and a staff of more than a hundred chemists are maintained by United Dairies for maintaining the purity of milk and dairy products.

MR. G. VIVIAN DAVIES, B.Sc., F.C.S., of the chemical research department of the National Oil Refineries at Llandovy, has accepted on appointment on the chemical staff of Shell Mex and B.P., Ltd., in South Wales.

THE LIBRARY OF THE CHEMICAL SOCIETY will be closed for stocktaking from Monday, August 7 until Saturday, August 19, inclusive, and will close each evening at 5 o'clock from August 21 until September 16.

MAGNIFICENT WEATHER favoured three performances of "Prunella" last week in the beautiful grounds of The Priory, Orpington, which proved an ideal spot for the staging of a singularly appropriate play, given in aid of the John Benn Hostel.

A NEW AND WELL-EQUIPPED CLUBHOUSE and recreation grounds for the employees of Scottish Dyes, Ltd., at Grangemouth, were opened on Saturday by Mr. H. J. Mitchell, a director of the parent company, Imperial Chemical Industries. The scheme has cost £10,000.

RECENT WILLS INCLUDE:—Eugene Herbert Nicoll, of Cannon Hill, Coventry, formerly a director of Baiss Bros. and Co., Ltd., manufacturing chemists, Bermondsey, £3,497 (net personalty £3,389); Richard Anstice Fox, of Yate (Gloucestershire), chairman of F. F. Fox and Co., Ltd., oil and chemical merchants, Bristol, £36,725 (net personalty £32,760).

A NEW POSSIBLE SOURCE OF VITAMIN D is indicated by R. W. Truesdail and H. J. Culbertson, who have studied the occurrence of fat-soluble vitamin D, which prevents rickets, in the oil of the California pilchard or sardine (Sardinea caerulea) and the tuna (Neothunnus macropterus). Their results indicate that, with improved methods of refining, edible tuna oil may be of therapeutic value, in the same manner as cod liver oil.

AT THE OIL INDUSTRIES EXHIBITION, July 19 to 25, Le Grand, Sutcliff and Gell, Ltd., the drilling and boring engineers, are exhibiting, in co-operation with their associates, The English Drilling Equipment Co., Ltd. The exhibits will include various types of well drilling and prospect plant, including a combined rotary-percussion outfit for borings down to 100 feet. In addition there will be a complete Abyssinian tube well outfit as used for obtaining water supplies from surface deposits. Many interesting rock cores, specimens, photographs and drawings will be shown, and much interesting information concerning the firm's activities will be available for the inquirer, at Stand No. 39.

MANUFACTURE OF ALCOHOL from corn for blending with imported gasoline is proposed by the recently formed South African Spirit Corporation, Ltd. This new company, capitalised at £100,000, has just been registered in Pretoria. In addition to distilling alcohol for industrial and commercial purposes from corn, barley, molasses, and other agricultural products the company intends to manufacture cattle feeds and other by-products. It is stated that the company has concluded a tentative agreement with the Central Agency for Co-operative Societies, Ltd., Johannesburg, for the supply of corn in bulk, and will begin operation when the necessary legislation upon which the agreement is dependent has been passed by Parliament.

EXEMPTION FROM CUSTOMS DUTY under the Import Duties Act has been extended to gum arabic and cobalt metal in the form of rondels, pellets or squares, but not including alloys of cobalt, by Import Duties (Exemptions) (No. 8) Order. This Order came into operation on July 14. Gum arabic is chiefly used in the manufacture of articles of food, particularly confectionery. It is also used industrially, being a thickening agent for the printing of textiles and for the manufacture of adhesives. The principal source of supply is the Anglo-Egyptian Sudan. Cobalt metal is used in the manufacture of special steels, and in the glass and pottery industries. The Empire source of supply are at present inadequate to meet home requirements.

TO ENCOURAGE OVERSEAS BUYERS to visit the British Industries Fair, a simplified plan of new travel concession has been adopted by representatives of leading Continental railway administrations, following a conference called in London by the Southern Railway. The Continental countries represented were Germany, Holland, France, Belgium, Switzerland, and Austria and their railway administrations have agreed to issue through return tickets to London and/or Birmingham at reduced rates varying from 25 per cent. to 33⅓ per cent. Reciprocal concessions are to be granted by the British railways to British visitors to Continental trade fairs which receive official recognition. For the first time in the history of the B.I.F., the French Railway Administrations have agreed to through booking facilities at reduced rates for visitors travelling from or through France.

THE ANNUAL HOLIDAY of Howards and Sons, Ltd., will necessitate the closing of the works for eight days from Monday, July 31, to Tuesday, August 8.

NEW WORKS fitted with the very latest machinery, for John Cowan and Co., Ltd., soap manufacturers, Irvine, Ayrshire, were opened on Saturday. The old works were destroyed by fire in November of last year.

A CHANGE OF ADDRESS is reported by the W. J. Southcombe Advertising Agency, Ltd. The new address will be 90 Lots Road, Chelsea, London, S.W.3 (Telephone: Flaxman 1456, five lines) to be effective on and after July 17.

BRITISH OVERSEAS CHEMICAL TRADE RETURNS for June show that exports of chemical, drugs, dyes and colours, amounted to a total of £1,586,401, being £39,815 higher than the figure for June, 1932. Imports totalling £773,658, were higher by £183,833, whilst re-exports totalling £672,793 were higher by £638,085, as compared with June, 1932.

SILK, SALT, SOAP, AND ALKALI MANUFACTURE are four characteristic Cheshire industries described in a supplement of the "Manchester Guardian Commercial," July 7, which details the industrial wealth and variety of Cheshire. Silk and salt are among the oldest industries in the county, soap and chemicals being comparative new-comers.

A DEPOSIT OF POTASSIUM CHLORIDE is reported to have been discovered on the edge of the Atacama Desert at 180 kilometres from Calama, with an area of 20 kilometres in diameter. It is said the mineral appears near the surface. Persons identified with the discovery believe that sufficient potassium chloride is available to warrant building a railroad from the nearest point on the Antofagasta-Bolivia Railway which is 100 kilometres distant.

MR. R. GILMAN BROWN, M.I.M.M., M.A.I.M.E., who was chairman of the technical committee and a director of the Mining Trust and some of its associated companies, died on July 6. Mr. Gilman Brown was taken ill on Sunday, and was operated upon for appenticitis. He made good progress during the early part of the week, but suffered a relapse late on Thursday. He was a former president of the Institution of Mining and Metallurgy.

ONE OF THE LARGEST DISTILLERIES IN THE WORLD is to be built at Peoria (Michigan) in readiness for the expected repeal of the Volstead Act in the United States. Its immediate erection, at a cost of over a million dollars (£200,000 at par), is planned by a well-known Canadian distillery firm, and fifteen acres of land have already been acquired. The firm have been granted a charter for the manufacture and marketing of liquor in the State of Michigan.

PROFESSOR FREUNDLICH, one of the most distinguished of the German scientists recently dismissed by the Nazis, is to be attached to University College, London, next year. The Head of the Department of Chemistry in this college is Professor Donnan, who has shown much activity lately in furthering the aims of the new Academic Assistance Council which was formed in this country to assist the expelled Jewish savants. He has been fortunate in securing for his college the help of Freundlich, who is one of the greatest authorities in the world on the chemistry of colloids.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Barbados.—A grocery merchant in Barbados wishes to obtain the representation of United Kingdom manufacturers of soap, especially blue mottled, on a purchasing basis. (Ref. No. 38.)

Canada.—A manufacturers' agent in Vancouver is desirous of obtaining the representation of United Kingdom manufacturers of drug lines, chemicals. He is understood to work on a commission basis, and covers the territory from Halifax to Vancouver. (Ref. No. 41.)

Austria.—An agent established at Innsbruck wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of artificial silk, chemicals and pharmaceutical products. (Ref. No. 50.)

Brazil.—A firm of commission agents, which also imports on its own account and is established in Rio de Janeiro, wishes to obtain the representation of United Kingdom manufacturers of linseed oil, vaseline, caustic soda and chemical products, artificial silk yarns. (Ref. No. 58.)

Brazil.—A firm established in Rio de Janeiro wish to obtain the representation of United Kingdom exporters of industrial chemicals, especially for enamelling pottery, glass, explosives and fireworks, textiles, etc. (Ref. No. 60.)

New Chemical Trade Marks

Compiled from official sources by Gee and Co., Patent and Trade Mark Agents, 51-52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to August 5, 1933.

Alloprene. 540,019. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Imperial Chemical Industries, Ltd., Imperial Chemical House, Millbank, London, S.W.1. March 18, 1933.

New Companies Registered

Chemical Engineering Association (Established 1912), Ltd. 171 Elgin Terrace, W.9. Registered June 30. Nominal capital £2,000 in 1,500 7½ per cent. cumulative participating preference shares of £1 and 10,000 ordinary shares of 1s. each. To carry on the business of manufacturing, importing and exporting chemical fluids for traders, etc. Directors: R. Shirley, 171 Maida Vale, W.9.; A. W. W. Horsbrugh.

Gas and Water Securities, Ltd. Registered on June 29. Nominal capital £100,000 in £1 shares. To acquire and hold stocks, etc. promote companies, manufacture, sell and supply gas, coke, coal-tar, pitch, asphaltum, ammoniacal liquor, cannel, creosote and other residual products obtained in the manufacture of gas. Subscribers: C. P. Dawnay, 3 Queen Street, W.1.; A. W. P. Macwhinnie.

Mulnol Products, Ltd., 187a West Regent Street, Glasgow. Registered in Edinburgh on June 29. Nominal capital £1,000 in £1 shares. Chemical manufacturers and merchants, drysalters, etc. Directors are: F. Taylor, 244 Great Western Road, Glasgow, C.A., J. E. Milligan, 8 Selborne Road, Glasgow, W.3.

Speedanseez Products, Ltd., 214 Walworth Road, S.E.17. Registered June 30. Nominal capital £2,000 in £1 shares. Makers of and dealers in paints, varnishes, stains, oils, enamels, chemicals, etc. Directors: C. S. Perls, 30 Stradella Road, S.E.24; J. F. T. Noakes.

Company News

Rhodesia Broken Hill Developments Co.—The profit in the year 1932 amounted to £23,169, against £7,853 in 1931, and a credit balance of £7,668 is carried forward, compared with a debit of £17,927 brought in.

W. and T. Avery, Ltd.—A final ordinary dividend is announced of 10 per cent., making the total for the year 15 per cent., less tax. The profits in the year to March 31, 1933, were slightly lower, the net balance of £95,512 comparing with £100,022 in the previous year. After payment of dividends, a surplus of £59,124 is carried forward.

Zinc Corporation.—The net profit for 1932 was £94,838, compared with £108,441 in 1931. To this is added £36,363 brought in, and £56,887 appropriated for new plant, making a total of £188,088. After payment of the fixed preferential dividends and participating dividends and appropriating for mine development and new plant £70,000 there remains a balance to be carried forward of £46,479.

Cellulose Acetate Silk Co.—The accounts for the period from March 27, 1932 to April 1, 1933, show a trading profit of £90,041, and a net profit of £38,041, the latter figure comparing with £5,000 actually earned in the preceding year, after eliminating compensation receipts in respect of contract cancellation.

Books Received

A Textbook of Elementary Qualitative Analysis. By Carl J. Engelder. London: Chapman and Hall, Ltd. Pp. 243. 13s. 6d.

Precipitated Chalk. History, Manufacture and Standardisation. By A. P. Wilson. Birmingham: John and E. Sturge, Ltd. Pp. 51. 2s. 6d.

The Analysis of Oil for the Production of Lubricants. By Arthur A. Ashworth. London: Ernest Benn, Ltd. Pp. 63. 9s.

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